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Missouri River Natural Resources Committee. Meeting.
Annual proceedings of the Missouri River

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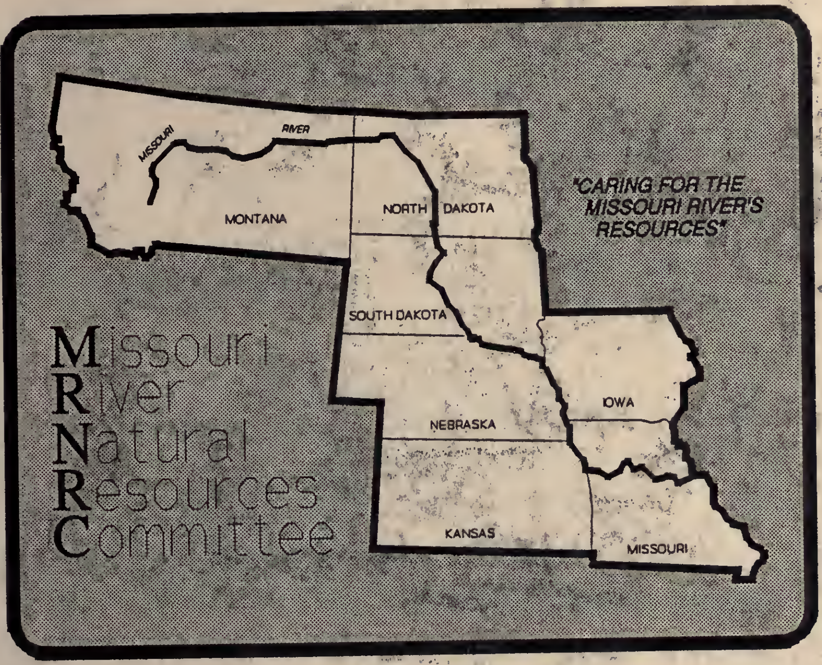

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SIXTH ANNUAL PROCEEDINGS
OF THE
MISSOURI RIVER
NATURAL RESOURCES COMMITTEE
1992

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Officers
# of the
Missouri River Natural Resources Committee

Elected at
Fifth Annual Meeting

to Serve During
1992

Chairman:	Dennis Unkenholz South Dakota Department of Game, Fish and Parks Joe Foss Building, 523 E. Capitol Pierre, South Dakota 57501
Chairman-Elect:	Gene Zuerlein Nebraska Game and Parks Commission P.O. Box 30370 Lincoln, Nebraska 68503

PLACE, DATE, AND OFFICERS OF PAST MEETINGS

Place	Date	Chairman	Chairman-Elect	Coordinator
Omaha, NE	Mar. 24, 1987	Tom Gengerke	Larry Peterman	Kent Keenlyne
Milwaukee, WI	Dec. 7, 1987	Tom Gengerke	Larry Peterman	Kent Keenlyne
Bismarck, ND	Mar. 22, 1988	Larry Peterman	Ken Brunson	Kent Keenlyne
Helena, MT	Aug. 29-31, 1988	Larry Peterman	Ken Brunson	Kent Keenlyne
Pierre, SD	April 3-4, 1989	Ken Brunson	James Ragan	Kent Keenlyne
KS City, KS	Aug. 21-22, 1989	Ken Brunson	James Ragan	Kent Keenlyne
Bismarck, ND	Mar. 29-30, 1990	James Ragan	Norm Stucky	Kent Keenlyne
Bismarck, ND	Aug. 20-22, 1990	Greg Power	Norm Stucky	Kent Keenlyne
Pierre, SD	April 10-11 1991	Norm Stucky	Dennis Unkenholz	Kent Keenlyne
St. Louis, MO	Aug. 12-14, 1991	Norm Stucky	Dennis Unkenholz	Kent Keenlyne
Minneapolis, MN	Mar. 9-10, 1992	Dennis Unkenholz	Gene Zuerlein	Kent Keenlyne
Pierre, SD	Aug. 4-6, 1992	Dennis Unkenholz	Gene Zuerlein	Kent Keenlyne

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accordance to a Master Manual which provides broad guidance for operating the system. Each August, the Corps begins preparation of an annual operating plan (AOP) presenting how it expects to operate the system during the upcoming year. In developing the AOP, the Corps holds public meetings to solicit comments and accept recommendations on operations.

Water management conflicts often arose over reservoir pool operation and downstream releases. A need existed for a unified group to deal exclusively with natural resource issues. In an attempt to achieve coordinated recommendations, the seven Missouri River States formed the Missouri River Natural Resources Committee (MRNRC).

The MRNRC has submitted Missouri River operation recommendations that benefit fish and wildlife to the Corps each year since the committee formed.

THE FUTURE

As concerns grow, competition for resources increase, and conflicts arise, the committee is prepared to face future needs. Specific issues are addressed through the formation of work groups and subcommittees to prepare recommendations for committee action.

In 1990, a Rare and Endangered Fish Subcommittee was formed to develop recommendations and facilitate data gathering on Missouri River endemic fish. In 1992, a tern and plover management team was established to oversee Corps' operations under the biological opinion on operation of the system. As future issues arise, the MRNRC is prepared to form other teams of knowledgeable individuals to obtain accurate information about the issues and to coordinate recommendations and activities.

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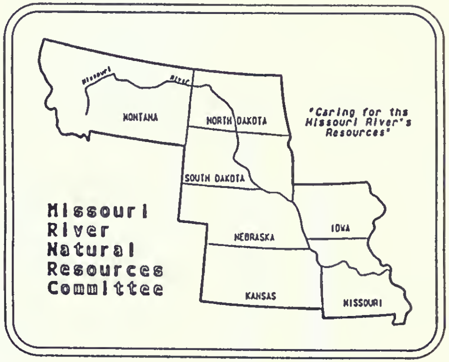
MISSOURI RIVER NATURAL RESOURCES COMMITTEE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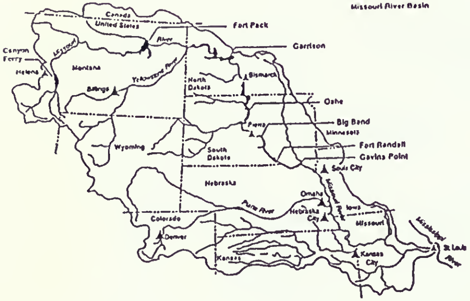
"Caring for the Missouri River's Resources"
Missouri River Natural Resources Committee

THE MRNRC

The Missouri River Natural Resources Committee, made up of representatives from the seven state natural resource departments along the Missouri River, Corps of Engineers, Fish & Wildlife Service, Western Area Power Administration, and Bureau of Reclamation, was established in 1987 to promote and ensure the good stewardship of the Missouri River. The committee was established primarily to facilitate a systems approach to managing the natural resources of the Missouri River, to promote preservation, wise utilization, and enhancement of the natural and recreational resources of the Missouri River, and to provide coordinated recommendations to appropriate agencies.

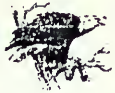
THE SYSTEM

Originating in the Rocky Mountains of south-central Montana, the Missouri River flows 2,300 miles through seven States ending at its confluence with the Mississippi River near St. Louis, Missouri.



A century ago, the Missouri River supported one of North America's most diverse and extensive riparian ecosystems. Its abundant side channels and oxbows, wooded islands, backwater areas, sandbar complexes, floodplain forests, and wet prairies supported an abundant and diverse assemblage of aquatic and terrestrial organisms. This "oasis" provided sustenance for small bands of native american peoples and vast numbers of fish and wildlife, and served as a mode of transport for the distribution of life-forms across the Great Plains.

As settlement of the Missouri River Basin ensued, human needs and desires focused on the river's unpredictable nature and its rich alluvial floodplain. In a relatively short span of 150 years, the river's riparian ecosystem was dramatically transformed to serve a growing country.



In the early 1900's the federal government began a process of levee construction, dam building, and channelization works to "tame" the mighty river. Today, the Missouri River is a highly regulated system which is vastly different than that of the past.

Along its upper course are seven main stem reservoirs that have submerged much of what was the former river under permanent pools. Remnants of the former river exist below some of the dams but are subject to highly modified flow regimes.

The lower river now consists largely of a constricted, rock-lined, single channel with swift currents. Many of the backwater chutes, oxbows, sloughs, and other floodplain features are gone resulting in reduced abundance and diversity of fish and wildlife habitat.

THE RESOURCE

As the Missouri River changed, so did the aquatic and terrestrial wildlife community that depended upon it. Some species have likely been eliminated and others suffer reduced population levels and reproductive success.

Probably one of the most severely impacted groups are the endemic, large river fish. Vegetation spawning species and those that rely upon the once abundant backwater areas, brushy habitats, and flooded vegetation have been reduced. Likewise, those that require seasonal flooding for their life requisites have also decreased. The new "river-lakes" have lowered temperatures in the river and cleared the waters creating niches for other species. Flat-water and cold-water species have gradually replaced riverine and turbid water species.

The river still serves as a major corridor for migrating birds and is home to a number of rare and endangered species.

OPERATION

Today, the river serves as a point of focus for the basin's economy. Water is stored in the Missouri River reservoirs to provide for commercial navigation on the river between Sioux City, Iowa, and St. Louis, Missouri. It provides flood protection, irrigation water, and municipal and industrial water supplies for basin communities; generates hydroelectric power; and supports a growing recreation industry in the upper basin states.

The Corps of Engineers operates the river system for flood control, navigation, federal irrigation projects, hydroelectric power generation, municipal and industrial water supplies, maintenance of water quality, recreation, fish and wildlife, and endangered species preservation. The system is managed in

Minutes of the
Missouri River Natural Resources Committee

Spring Meeting
March 9-10, 1992

Airport Hilton
Minneapolis, Minnesota

March 9

The meeting was called to order by Chairman Unkenholz at 1 p.m. at the Airport Hilton in Minneapolis (agenda attached). All state delegates were present as well as representatives from the Fish & Wildlife Service, Corps of Engineers, and Bureau of Reclamation (attendees list attached). No adjustments were made to the agenda.

Keenlyne summarized highlights of the Missouri Basin States Association meeting held on March 5 and 6 in Jackson Hole, Wyoming. Arvid Thomsen informed MBSA that the Corps would be increasing flows from Gavins Pt. Dam on March 15 in preparation for the navigation season. System storage figures for the March 1 checkpoint indicate releases of 5500 cfs below full service for the year. The Corps will hold two AOP public meetings on April 15 in Pierre, South Dakota, and on April 16 in Jefferson City, Missouri. They will also prepare a "Scope of the EIS" report in mid-April. Dick Schirk, WAPA, had mentioned that additional electricity will need to be purchased in late summer because Ft. Peck will not be producing from the repaired unit until fall. It is predicted by WAPA that power capacity problems will culminate in 1999. Brenda Schilf reported that Missouri River Basin tribes will meet in Denver the third week in April to discuss water issues. Kansas, Schilf, and USGS representatives alerted MBSA members about contaminant problems on the river. Keenlyne mentioned that the MRNRC might need to get involved in contaminant issues in the near future. USGS's NAWQA water quality assessment program evaluated the North and South Platte Rivers in 1991, will assess 20 more rivers in 1994, and start additional assessments in 1997. Keenlyne suggested that the MRNRC might want to send a letter to USGS requesting that the Missouri River be selected for the 1994 assessments. Keenlyne also mentioned that MBSA is seeking funding from EPA's Environmental Education Grant Program as a possible source of funding for newsletters. MBSA will be reconvening their hydrology work group, again, to prepare a recommendation for the 1993 AOP. It was suggested that MRNRC might want to consider drafting a letter requesting that MBSA consider members from all the working groups to broaden the interests. MBSA's next meeting will be June 29 - July 1 in Denver. During this meeting a workshop will be held to evaluate Master Manual Review value functions. Keenlyne suggested that MRNRC request an opportunity to also review how the value function models work and what the outputs will look like. Kent will pursue getting MRNRC members on the MBSA mailing list. He also mentioned that he had obtained a copy of the Government Accounting Office's recent report titled "Corps' Management of Ongoing Drought in the Missouri River Basin." Of interest to this group, the GAO found no basis for prioritizing uses for management of the system. Kent will send a copy of the report to all attendees that do not already have a copy.

Dave Wooster provided the attached handout "Corps Data for MRNRC Meeting." Snowpack is 78% of average for the upper Missouri River Basin as of March 1. Estimated Missouri River runoff for the year is 21.4 MAF which is 89% of normal. System storage criteria for March 1 triggers release of 14.6 MAF from Gavins Pt. Dam for the year, presuming average precipitation for the remainder of the year. Forecasts show that a decrease in power production will occur. It is estimated that WAPA will have to purchase $25 million worth of electricity in 1992 including a capacity purchase as a result of Ft. Peck's repair.

Wooster asked for the committee's opinion regarding a potential management change on Lake Francis Case for fish spawning. An alternative was to hold the reservoir at a constant level of 1355 msl or to raise it by three feet over a two-month period from April 1 through June 1. Water for a rise would come from balancing the system out of Oahe and Garrison. Unkenholz stated that he would like to keep Oahe high and rising to submerge vegetation. If Oahe rose by one or two feet, vegetation would be submerged for spawning. Greg Power reported that he had contacted Wooster regarding this action and had sent him a possible flow scenario out of Garrison that North Dakota could support which would raise Oahe. Garrison would rise more slowly under this option (sheet titled "Based on Average Precipitation" attached). **The committee agreed to draft a letter to the Corps in support of an attempt to increase Oahe to submerge the shoreline vegetation for spawning starting in time for northern pike spawning.** Unkenholz stated that he would prefer Lake Francis Case be maintained at a constant level to accomplish the Oahe increase.

Wooster reported on last year's success for terns and plovers and indicated that fledge ratios for the biological opinion had not been met. Survival of young was poor in 1991 due to predation and flooding. Numbers of adults increased, however. The Corps recently met with the Service to discuss 1992 management strategies for terns and plovers along the Missouri River. In 1992, spiking will take place every third day at both Gavins Point and Fort Randall Dam as in the past. Because of the water shortage and problems with catching young birds on the islands after low spiking releases, Wooster indicated that he would like to be able to dip below MRNRC's recommended 20,000 cfs minimum release below Ft. Randall to allow for more flexibility. Concern was conveyed about the important spawning beds located below Fort Randall Dam to the mouth of the Niobrara. Different release scenarios were discussed (pg. 29 of handout).

Norm Stucky reported that Missouri has not had specific recommendations in the past but probably will in the future after the ongoing value functions are completed. At present, they support actions that benefit the system and continue to back MRNRC's recommendations of a natural hydrograph (minimum flows in the summer; extended flows into November). Missouri is holding another Constituency meeting on May 14-15.

Gordon Farabee, Missouri's Large River Biologist, reported on Missouri's recently completed "Big River Fisheries Ten Year Strategic Plan." One of his responsibilities is to work on the Missouri River mitigation projects. The first mitigation project, Grand Passe, has already been started and will cost an estimated $500,000. He is also involved with a creel census project on blue, channel, and flathead catfish to evaluate the effects of the commercial harvest closing and has set up five sample sites on the Missouri River for this project. He will be working with the Missouri Dept. of Health to evaluate contaminants which could lead to a revision of the state's recommendations regarding contaminants in fish. A study recently done found low concentrations of chlordane in fish blood samples.

Steve Adams reported that elevated levels (above EPA's action levels) of atrazine have been found in Perry Lake. Perry Lake is a reservoir on the Delaware River, a Kansas River tributary. He reported that the state will ban commercial catfish harvest on the Missouri in cooperation with other lower basin states and that he is working on potential Missouri River mitigation projects. He reported that last year the Corps had drawn down reservoirs on the Kansas River in support of Missouri River navigation. The state has received numerous calls from recreationists (marina owners, bait shops, etc.) complaining about low water levels on the reservoirs. The reservoir conditions required that boat ramps and water intakes be moved. Because increased releases from the Kansas River only result in about two inches of Missouri River flow at Kansas City, Adams questioned if the Kansas River reservoir contribution was really necessary or cost effective. He also questioned whether impacts to the Kansas River were included in the Missouri River's Master Manual review impact assessment since the river is included in Missouri River operations. He indicated that utilization of the Kansas River reservoirs has major impacts in Kansas.

Duane Sveum stated that the Corps was aware of the situation and that the Kansas River is not presently part of the Missouri River Master Manual evaluation. The reservoirs have their own master manuals and are not included under the Missouri River studies. He explained that navigation flow targets for the Missouri exist at four locations, Kansas City being one of them, and to meet these flow targets, Kansas River Project water must be used at times. He explained that a change in operation of a project triggers the review process. The Corps determined that the Missouri River's Master Manual revision would not cause any changes in current Kansas River Project operations and, because of this, the system would not be affected. Adams believed that the benefits/impacts of Kansas River contributions to the Missouri should be analyzed. Sveum indicted that Kansas River reservoirs have better potential for refill than the Missouri River main stem reservoirs.

Stucky moved to draft a letter suggesting that the Corps consider impacts on Missouri River tributary reservoirs (namely the Kansas River project) when developing alternatives for the Master Manual review. The letter can refer back to MRNRC's earlier scoping letter recommending that the Corps look at the river from an ecosystem viewpoint. The motion was seconded by Gengerke and carried. Adams will draft a letter and circulate it for review.

Tom Gengerke reported that, like Missouri, Iowa will wait for the value functions before making any specific recommendations. He mentioned that the Louisville Bend mitigation project is ready. Taylor stated that it is scheduled to go after the purchase of some mitigation acreage in Kansas is done.

Wes Sheets introduced Gene Zuerlein who will be the new Nebraska delegate. He mentioned that the closing of commercial catfish harvest on the Missouri is historically significant. He described a one-year Missouri River user survey that the state will be conducting. It is patterned after Fleener's methodology and could be repeated at five-year intervals. He expressed concern about degradation below Fort Randall Dam that affects the spawning beds and emphasized the importance of the river following natural hydrologic cycles. The committee was urged to continue to recommend that the Corps consider operation of the system to achieve this.

A discussion ensued about the process MBSA used last year to develop an AOP recommendation and their quick dismissal of the MRNRC's proposal. It was suggested that MRNRC present their recommendation rationale to the MBSA, emphasizing the broad expertise and consideration that exists on the committee. Since the MBSA will be forming their AOP review group soon, the MRNRC should interact with MBSA through their state representative. The Corps' representatives were asked why the consensus recommendation of the MRNRC had less weight than the split decision by the MBSA? Sveum acknowledged that he did not have an answer and, when asked, did not know how the Corps would have reacted had MBSA made the same recommendation that the MRNRC did. After some discussion, it was suggested that it would be very timely for the committee to set up a meeting with the new Colonel. Sheets moved, Adams seconded, and a motion carried to send a letter to Col. John E. Schaufelberger requesting a meeting. Unkenholz will write the letter. The meeting should include an upper and lower river representative. Adams, Stucky, and Sheets will work with Unkenholz to set up the meeting and meet with the Colonel.

Dennis Unkenholz suggested that the committee periodically revisit MRNRC's recommendations for minimum flows below Fort Randall Dam. He also reported that he favored Wooster's suggestion to keep Lewis & Clark Lake at 1206 msl and, because each river segment that supports terns and plovers is different, he would like to see tern and plover data defined by river section. He indicated that water elevation on Oahe is just reaching vegetation and that the state would like to submerge this vegetation by two or three feet this year in time for northern spawning. In response to Wooster's question about elevations of Lake Sharpe, Unkenholz stated a situation similar to last year, where the lake only fluctuated by one foot, was desired.

Greg Power provided a handout titled "1991 Missouri River System (North Dakota) Highlights" (attached). He stated that they would like increased water levels in Lake Sakakawea but realized that levels will probably not even come close to the high level mark; therefore, they would like to see shoreline vegetation submerged on Oahe. North Dakota recommends that releases from Garrison be structured to achieve this. It was mentioned that this would not alter downstream releases.

Chris Hunter reported that Ft. Peck Reservoir had rising water levels and good production last year mostly due to submerging vegetation, although it came a little late. The state stocked 93,000 lake trout last year which is unlike most years when no stocking of the species is deemed necessary. He would like to see the pool level rise to 2226 msl but is not optimistic. Elevated levels of naturally occurring arsenic have been detected in the Yellowstone River. The paddlefish roe project generated $300,000 in 1991 of which the Department received about $100,000 after expenses. This will help fund a five-year study on harvest rates contracted to Dennis Scarnecchia out of the Idaho Unit. The BR will be providing money for pallid sturgeon work again stationing creel clerks at Intake and Robinson Bridge.

Upon completion of the state reports, discussion ensued regarding revisions to MRNRC's AOP recommendation. It was decided that Unkenholz and Power will draft the letter to include:

- Support for Option 2, the concept of reducing high and low extremes, (pg. 29 of Wooster's handout) for terns and plovers.
- Request 20,000 cfs minimum releases for fisheries from Fort Randall Dam as in the past.
- Support trade-off at Oahe and Garrison (encourage the Corps to do what is necessary to raise Oahe).
- Hold Lake Francis Case at a 1355 msl with no April 1 to June 1 rise.
- If additional water is present in the system over expected, use for navigation at minimum service through navigation season.

Hunter mentioned a topic discussed earlier about MRNRC coordination with MBSA. It was decided that Unkenholz, Keenlyne, and Whitmore would draft a letter to MBSA's President, Dave Sprycynatyk, with a carbon copy to Richard Opper to include:

- MRNRC's background emphasizing the committees broad scope of resource interests (not just fisheries) - can enclose MRNRC brochure for this.
- Emphasize MRNRC's autonomy and continuing existence as a Missouri River player.
- Convey the committee's expertise and diverse background.
- State the committee's recommendation.
- Convey MRNRC's interest in working with MBSA.
- Invite MBSA chairman to attend MRNRC meeting.

MRNRC delegates were encouraged to work with their MBSA representatives. The coordinator commented that the committee think about having an MRNRC representative sit in on MBSA meetings. It was decided that, to keep MBSA apprised of MRNRC activities, Richard Opper should be placed on MRNRC's mailing list.

A copy of a letter from Galen Buterbaugh in response to MRNRC's letter in support of the Service's Missouri River Initiative (MOR-CARE) was handed out (copy attached). The role the MRNRC will play in the initiative, if it gets funded, will likely be an advisory role.

March 10

Doug Latka informed the group that the Corps is required under the Missouri River Biological Opinion to set up a tern and plover management team to oversee operations that affect the birds. The team is to be made up of state and federal people knowledgeable about terns and plovers. He proposed that this team be brought under the auspices of the MRNRC to help alleviate the number of separate operation recommendations the Corps receives. After discussion, Power moved to bring the tern and plover management team under the MRNRC, Adams seconded, and the motion carried. Latka will organize the group with Keenlyne's assistance.

Joel Medlin dispersed a summary of the Service's biological opinion on operations of the Missouri River main stem system (copy attached). It was found that operations were not likely to jeopardize the bald eagle; however, non-mandatory conservation recommendations were given. It was determined that operations would likely jeopardize terns and plovers; therefore, mandatory reasonable and prudent measures/alternatives were listed. Because the pallid sturgeon is now listed, the biological opinion review process will be initiated now for this species.

Whitmore gave an update on the paddlefish listing and CITES petition. As requested, the information presented is described in the attached report.

A recent Service letter requesting information on the blue sucker was questioned. Joel Medlin explained that a status review was being conducted and that the blue sucker was in his station's Work Activity Guidances. The Service will be requesting status information on the species from the states. Medlin stated that they will also be conducting surveys on the sturgeon chub and sicklefin chub and will use Selena Werdon's recent work as background.

Sheets reported that all 28 states in the Mississippi River Basin have signed onto MICRA. A decision was made to remove Michigan from the basin list as very little water drains from the state to the basin, and the state does not consider themselves in the basin. Jerry Rasmussen, MICRA coordinator, has been finalizing duties, goals, and objectives. A brochure and legislative alert were dispersed throughout the basin describing the Interjurisdictional Rivers Bill (H.R. 4169) introduced into Congress and asking that letters of support for the bill be sent to congressmen. The bill would establish a national fisheries council and provide for a pilot test of MICRA. Rasmussen stated it was critical, at this point, for letters of support for the bill be sent to congressmen to ensure progression through the legislative process. He feels this type of "grass roots" effort is what can insure success. It was decided that Gengerke will draft a letter for the chairman's signature in support of HR 4169 to go out to Congressional committees and representatives. Rasmussen will supply mailing labels for appropriate letters.

Whitmore reported for the Rare and Endangered Fish Subcommittee. Subcommittee members have been identified, and a list of species is nearly complete. After the species list is finalized, data gathering for each species will commence.

Roger Collins updated the group on the status of reports for the master manual study. The Corps anticipates having all the environmental resource studies (reservoir aquatics; riverine; wildlife, namely terns and plovers; wetland riparian; and water quality/recreation) done by the end of April. Upon completion, value functions will be identified and modeling done to determine operation options. The Corps would like one option to fall within current authorization and one that would fall outside. In examining the system as an ecosystem, the Service has continually found the simulation of natural hydroperiod flows to be an important concept. According to the finalized scopes of work, the Service is required to prepare a planning aid report on endangered species and a comprehensive report summarizing all EQ planning and environmental studies done in 1991 and 1992. These reports will be done following the completion of the environmental studies and value function formulation.

Miscellaneous business items discussed include:

- The group discussed a draft MRNRC brochure. Delegates are to send comments/edits to Whitmore by April 1.

- Sheets moved, Gengerke seconded, and a motion carried to include the Bureau of Reclamation as a cooperating agency. Dennis Brietzman, Bismarck, will be the designated representative. Unkenholz will write a letter to the BR confirming this.

- Delegates will review and send to Whitmore edits/changes/additions to MRNRC's mailing list.

- It was agreed that an additional program to fund travel for meeting attendance was not necessary at this time.

- Keenlyne was given the task of evaluating the committee's effectiveness over the last five years for the August meeting.

- Power reported that North Dakota will be conducting a recreational survey via creel census on the entire Missouri River in the state. He posed the possibility of a coordinated study being done on the entire Missouri. A plan of action would need to be developed. Farabee offered to give a report on a similar kind of study which was done by the UMRCC under the guidance of George Fleener. A decision was made to pursue this idea with a target date of 1995. Delegates are to send their state's recreational survey methods to Farabee who will summarize and compare them and present the results at the summer meeting. It was suggested that someone from Nebraska give a presentation at the summer meeting on how their study was done.

Unkenholz announced that the summer meeting will be held in Pierre, South Dakota, August 4-6 starting at 1 p.m. He asked that delegates think of potential agenda items and let him know. Two subjects mentioned were updates on contaminants issues and on terns and plovers (Casey Kruse could present).

MRNRC Spring Meeting Attendees List
March 9-10, 1992

Wes Sheets	NE Game & Parks Commission	402-471-0641
Gene Zuerlein	NE Game & Parks Commission	402-471-5555
Duane Sveum	Corps of Engineers, Omaha	402-221-7347
Sharon Whitmore	Fish & Wildlife Service, Pierre	605-224-8693
Dennis Brietzman	Bureau of Reclamation, Bismarck	701-250-4592
Joel Medlin	Fish & Wildlife Service, Bismarck	701-250-4402
Greg Power	ND Game & Fish Dept., Bismarck	701-221-6552
Jim Milligan	Fish & Wildlife Service, Columbia	701-876-1911
Gordon Farabee	MO Department of Conservation	314-751-4115
Norm Stucky	MO Department of Conservation	314-751-4115
Steve Adams	KS Dept. of Wildlife & Parks	913-296-2281
Chris Hunter	MT Fish, Wildlife & Parks	406-444-3183
David Wooster	Corps of Engineers	402-221-7350
Dennis Unkenholz	SD Game, Fish & Parks	605-773-5535
Roger Collins	Fish & Wildlife Service, Bismarck	701-250-4402
Jerry Rasmussen	Fish & Wildlife Service, Columbia	314-876-1911
Tom Gengerke	IA Dept. of Natural Resources	712-336-1714
Doug Latka	Corps of Engineers, Omaha	402-221-7281
Dick Taylor	Corps of Engineers, Omaha	402-221-7279
Kent Keenlyne	Fish & Wildlife Service, Pierre	605-224-8693

Draft Meeting Agenda

Group name: Missouri River Natural Resources Committee

Meeting title: Spring Meeting

Date(s): March 9 & 10, 1992 Start time(s): 1:00 p.m. on the 9th
End time(s): 12:00 p.m. on the 10th

Place: Airport Hilton near the Twin Cities Airport

Specific meeting objectives:
1. Develop revised recommendation to COE regarding 1991-92 AOP.
2. Updates on Missouri River Activities.
3. Conduct any group business as necessary.

Manager/chairperson: Unkenholz Facilitator: Unkenholz Recorder: Whitmore

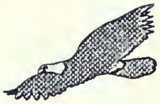
Other participants: state delegates, representatives from FWS, COE and BR

Background materials: previous annual reports, attachments to agenda Please bring: new business items, final water level recommendations

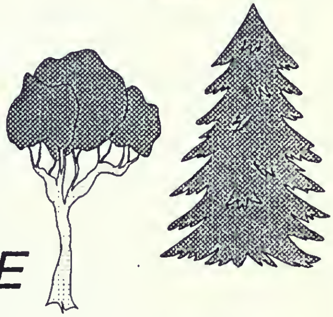
Time	Agenda Topic	Person Responsible	Process	Product
March 9, 1992				
1:00 p.m.	Welcome/agenda adjustments	Unkenholz	Group discussion	Final agenda
1:15 p.m.	Report from March 5-6 MBSA Meeting	Keenlyne	Report	Informed Group
1:30 p.m.	Reports and recommendations from each state delegate	State delegates	Individual reports	Informed group
3:00 p.m.	Break			
3:15 p.m.	Continue 1:30 agenda topic			
3:30 p.m.	Reservoir Control Center (RCC) report	Wooster	Individual report	Informed group
4:30 p.m.	Group discussion	Unkenholz	Facilitated discussion	Revised recommendation for AOP

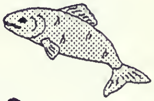
Time	Agenda Topic	Person Responsible	Process	Product
5:00 p.m.	Adjourn			
7:00 p.m.	Optional maeting time to be determined at 1:00 p.m.			
March 10, 1992				
8:00 a.m.	Overview on tern and plover biological opinion	Medlin	Individual report	Informed group
8:15 a.m.	Potential tern and plover management team	Latka	Individual report	Defined team
8:45 a.m.	CITIES overview and paddlefish listing	Whitmore	Individual report	Informed group
9:00 a.m.	Interjurisdictional rivers bill and MICRA	Sheets	Individual report	Informed group
9:30 a.m.	Rare and endangered fish subcommittee	Whitmore	Individual report	Informed group
9:45 a.m.	Master manual study update	Medlin Latka	Individual report	Informed group
10:00 a.m.	Break			
10:15 a.m.	MRNRC business Request by BR for membership Travel funding Meeting between MRNRC reps and Col. Hazan Analysis of past MRNRC effectiveness MRNRC brochure Other	Unkenholz	Group discussion	Final decisions

Corps Data For



MISSOURI RIVER NATURAL RESOURCES COMMITTEE MEETING





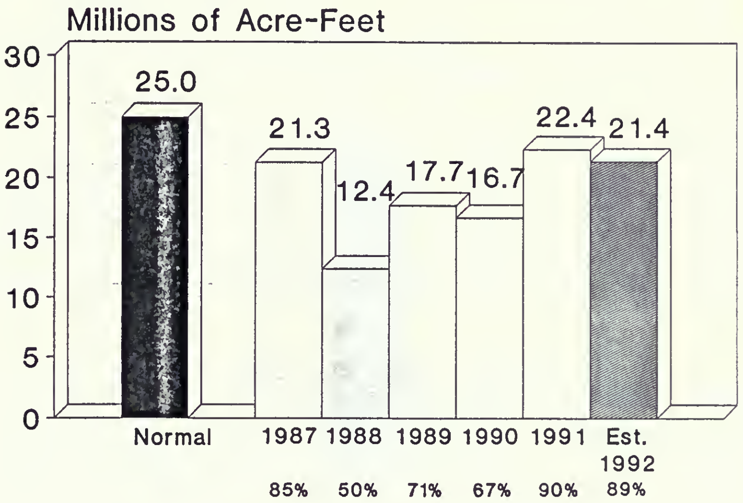
Minneapolis, 9 & 10 March 1992

03/01/92

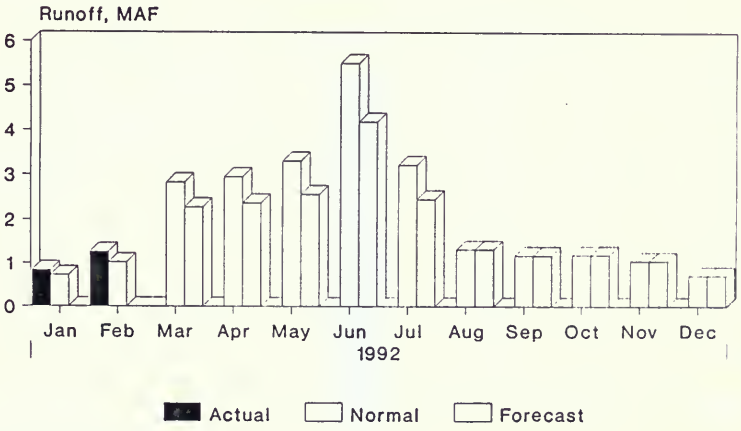
Snow - Precipitation Update
for the Upper Missouri River Basin

Basin	Snowpack Water Content % of Average	Precipitation % of Average
Above Three Forks	87.6	83.6
Btwn 3 Forks & Ft	80.5	74.6
Total Above Ft. Peck	84.9	80.0
Upper Yellowstone	79.7	81.0
Wind and Bighorn	72.9	72.8
Powder and Tongue	77.9	85.7
Total Ft Peck to Gar	76.2	78.7
Upper North Platte	78.8	80.9
Lower North Platte	71.7	72.0
Total North Platte	75.8	77.1
South Platte River	72.5	74.9

Missouri River Runoff Above Sioux City CY 1987-1991 Vs Normal



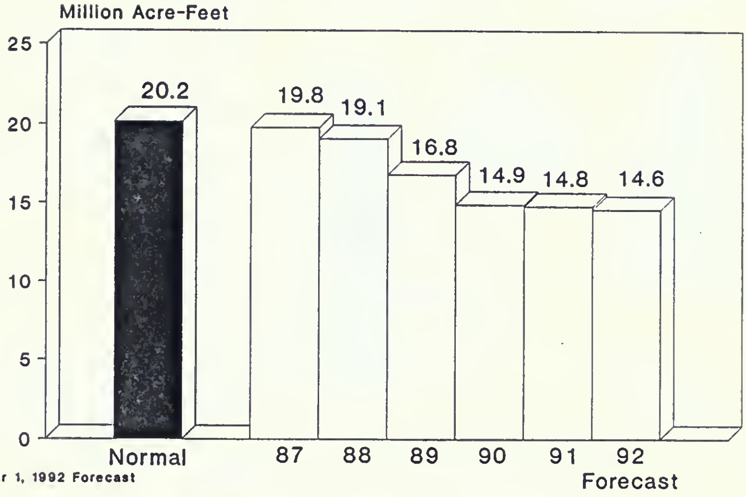
CY 1992 Missouri River Runoff Above Sioux City, Iowa



Mar Fcst: 21.4 MAF
Normal: 25 MAF

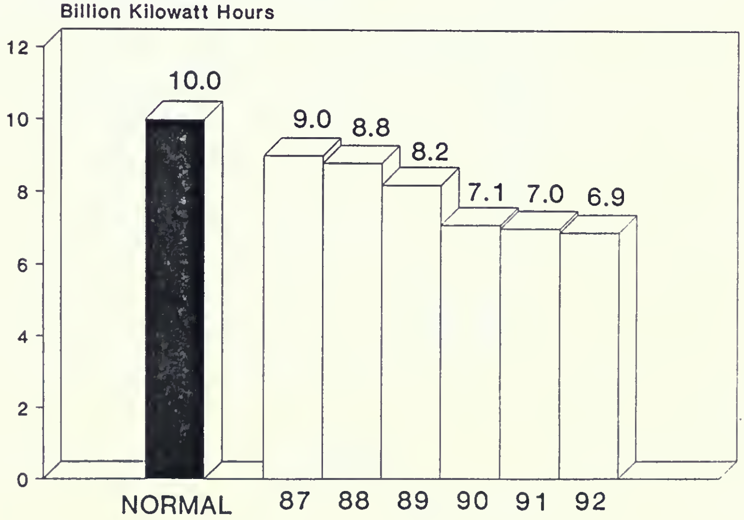
Gavins Point

Average Annual Release



Mar 1, 1992 Forecast

Main Stem System Generation



Mar 1, 1992 Forecast

MARCH 1, 1992 FORECAST BASED ON AVERAGE PRECIPITATION

Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 03/03/92

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2216.8	2216.9	2217.1	2217.8	2218.8	2219.1	2218.8	2219.7	2220.2	2220.1	2219.3	2218.0	2217.2
DISCH KCFS	7.4	7.9	7.9	6.6	7.5	7.5	7.5	4.1	4.1	6.6	9.0	11.0	11.0
GARRISON													
ELEV FTMSL	1820.8	1823.1	1825.1	1825.0	1827.2	1827.7	1826.9	1827.3	1827.7	1827.9	1826.6	1825.0	1823.9
DISCH KCFS	20.4	10.5	14.0	17.0	20.5	20.5	20.5	10.6	10.6	12.9	20.0	24.0	24.0
OAHE													
ELEV FTMSL	1591.5	1593.5	1594.0	1593.8	1594.9	1593.9	1592.0	1589.4	1590.1	1591.3	1591.9	1593.6	1595.6
DISCH KCFS	14.2	9.9	18.1	21.2	21.1	25.2	27.3	22.4	7.4	7.2	16.3	17.0	15.2
BIG BEND													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	10.1	18.1	21.2	21.1	25.1	27.0	22.0	7.0	6.8	16.1	17.0	15.2
FORT RANDALL													
ELEV FTMSL	1353.7	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1351.4	1337.6	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	8.3	11.5	20.1	23.0	23.1	25.7	27.1	27.6	22.1	7.0	10.7	11.5	8.5
GAVINS POINT													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.3	22.8	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	45399	46619	47319	47360	48386	48349	47599	46915	46369	46683	46654	46767	47218
ENERGY GWH		388.3	576.8	676.3	689.8	784.7	819.0	624.5	408.9	314.3	550.6	619.4	519.3

MARCH 1, 1992 FORECAST, ADJUSTED LOWER DECILE RUNOFF

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2216.8	2215.3	2213.9	2213.1	2211.9	2211.3	2210.7	2211.0	2211.6	2211.7	2210.6	2208.7	2207.2
DISCH KCFS	7.4	7.9	7.9	6.6	7.0	7.0	7.0	4.6	3.7	4.5	8.0	10.5	10.5
GARRISON													
ELEV FTMSL	1820.8	1822.2	1823.6	1822.4	1821.6	1821.3	1820.5	1820.9	1821.0	1820.5	1818.4	1816.7	1815.6
DISCH KCFS	20.4	10.0	11.0	17.0	18.0	18.0	18.0	10.1	10.1	11.8	20.0	21.0	21.0
OAHE													
ELEV FTMSL	1591.5	1592.1	1591.0	1589.8	1588.7	1586.5	1584.5	1583.6	1582.7	1583.6	1584.3	1585.2	1586.9
DISCH KCFS	14.2	12.2	19.8	23.1	24.1	26.3	24.8	14.6	13.5	7.7	16.5	17.3	14.1
BIG BEND													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	12.4	19.8	23.1	24.1	26.2	24.5	14.2	13.3	7.5	16.3	17.3	14.1
FORT RANDALL													
ELEV FTMSL	1353.7	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1342.3	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	8.3	12.6	21.0	24.1	24.7	26.4	27.4	27.9	18.1	7.5	11.0	11.8	7.3
GAVINS POINT													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.4	22.8	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	45399	45781	45616	44875	44201	43491	42551	41713	41326	41452	41200	41039	41293
ENERGY GWH		418.9	574.1	699.4	699.6	761.0	746.5	519.1	431.6	286.0	527.3	574.9	452.3

MARCH 1, 1992 FORECAST, ADJUSTED UPPER DECILE RUNOFF

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2216.8	2217.8	2219.4	2221.8	2226.2	2227.5	2227.6	2227.7	2227.5	2227.5	2226.5	2225.4	2224.7
DISCH KCFS	7.4	8.0	8.0	6.6	8.0	8.0	8.0	8.0	8.0	7.4	11.0	12.0	12.0
GARRISON													
ELEV FTMSL	1820.8	1823.8	1826.4	1827.0	1831.8	1833.7	1832.8	1831.9	1833.5	1833.9	1833.3	1832.1	1831.3
DISCH KCFS	20.4	12.0	18.0	21.0	23.5	23.5	23.5	22.5	10.7	14.9	20.0	25.0	25.0
OAHE													
ELEV FTMSL	1591.5	1594.9	1597.2	1598.6	1601.6	1601.5	1600.3	1599.7	1598.5	1598.1	1598.6	1600.3	1601.8
DISCH KCFS	14.2	7.5	16.9	19.9	19.0	25.7	28.3	26.3	17.0	16.2	17.1	17.1	18.2
BIG BEND													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	7.8	16.9	19.9	19.0	25.7	28.1	26.0	16.7	16.0	16.9	17.1	18.2
FORT RANDALL													
ELEV FTMSL	1353.7	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	8.3	10.5	19.5	22.5	22.3	26.6	28.5	28.9	27.2	24.1	11.6	11.7	11.7
GAVINS POINT													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.5	23.2	26.0	26.2	28.9	29.9	30.2	29.2	26.5	13.4	13.5	15.0
SYSTEM													
STORAGE 1000 AF	45399	47331	48890	49880	52887	53647	53081	52522	51977	51500	51604	51854	52309
ENERGY GWH		367.5	594.4	698.5	696.7	844.2	889.4	827.5	617.9	578.6	604.2	660.6	613.0

MARCH 1, 1992 FORECAST BASED ON AVERAGE PRECIPITATION

Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 03/03/92

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2216.8	2216.9	2217.1	2217.8	2218.8	2219.1	2218.8	2219.7	2220.2	2220.1	2219.3	2218.0	2217.2
DISCH KCFS	7.4	7.9	7.9	6.6	7.5	7.5	7.5	4.1	4.1	6.6	9.0	11.0	11.0
GARRISON --------------													
ELEV FTMSL	1820.8	1823.1	1825.1	1825.0	1827.2	1827.7	1826.9	1827.3	1827.7	1827.9	1826.6	1825.0	1823.9
DISCH KCFS	20.4	10.5	14.0	17.0	20.5	20.5	20.5	10.6	10.6	12.9	20.0	24.0	24.0
OAHE ------------------													
ELEV FTMSL	1591.5	1593.5	1594.0	1593.8	1594.9	1593.9	1592.0	1589.4	1590.1	1591.3	1591.9	1593.6	1595.6
DISCH KCFS	14.2	9.9	18.1	21.2	21.1	25.2	27.3	22.4	7.4	7.2	16.3	17.0	15.2
BIG BEND --------------													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	10.1	18.1	21.2	21.1	25.1	27.0	22.0	7.0	6.8	16.1	17.0	15.2
FORT RANDALL ----------													
ELEV FTMSL	1353.7	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1351.4	1337.6	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	8.3	11.5	20.1	23.0	23.1	25.7	27.1	27.6	22.1	7.0	10.7	11.5	8.5
GAVINS POINT ---------													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.3	22.8	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	45399	46619	47319	47360	48386	48349	47599	46915	46369	46683	46654	46767	47218
ENERGY GWH		388.3	576.8	676.3	689.8	784.7	819.0	624.5	408.9	314.3	550.6	619.4	519.3

MARCH 1, 1992 AVG PRECIP FCST, FORT RANDALL FILLED TO 1356.5 BY MAY 31

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2216.8	2216.9	2217.1	2217.8	2218.8	2219.1	2218.8	2219.7	2220.2	2220.1	2219.3	2218.0	2217.2
DISCH KCFS	7.4	7.9	7.9	6.6	7.5	7.5	7.5	4.1	4.1	6.6	9.0	11.0	11.0
GARRISON --------------													
ELEV FTMSL	1820.8	1823.2	1825.2	1824.7	1826.9	1827.5	1826.6	1827.2	1827.7	1827.9	1826.6	1825.0	1823.9
DISCH KCFS	20.4	10.5	14.0	18.5	20.5	20.5	20.5	10.1	10.1	12.6	20.0	24.0	24.0
OAHE ------------------													
ELEV FTMSL	1591.6	1594.0	1594.0	1593.6	1595.1	1594.2	1592.3	1589.6	1590.2	1591.3	1591.9	1593.6	1595.6
DISCH KCFS	14.2	8.3	20.3	23.3	19.2	25.2	27.3	22.4	7.4	7.2	16.3	17.0	15.2
BIG BEND --------------													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	8.6	20.3	23.3	19.2	25.1	27.0	22.0	7.0	6.8	16.1	17.0	15.2
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1353.5	1355.0	1356.5	1355.2	1355.2	1355.2	1351.4	1337.6	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	8.3	11.5	20.1	23.0	23.1	25.7	27.1	27.6	22.1	7.0	10.7	11.5	8.5
GAVINS POINT ---------													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.3	22.8	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	45399	46619	47319	47353	48386	48349	47599	46917	46371	46683	46654	46767	47218
ENERGY GWH		369.5	601.7	714.3	667.5	784.7	819.1	620.7	404.8	312.4	550.6	619.4	519.3

MARCH 1, 1992 FORECAST, ADJUSTED LOWER DECILE RUNOFF
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 03/03/92

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2216.8	2215.3	2213.9	2213.1	2211.9	2211.3	2210.7	2211.0	2211.6	2211.7	2210.6	2208.7	2207.2
DISCH KCFS	7.4	7.9	7.9	6.6	7.0	7.0	7.0	4.6	3.7	4.5	8.0	10.5	10.5
GARRISON													
ELEV FTMSL	1820.8	1822.2	1823.6	1822.4	1821.6	1821.3	1820.5	1820.9	1821.0	1820.5	1818.4	1816.7	1815.6
DISCH KCFS	20.4	10.0	11.0	17.0	18.0	18.0	18.0	10.1	10.1	11.8	20.0	21.0	21.0
OAHE													
ELEV FTMSL	1591.5	1592.1	1591.0	1589.8	1588.7	1586.5	1584.5	1583.6	1582.7	1583.6	1584.3	1585.2	1586.9
DISCH KCFS	14.2	12.2	19.8	23.1	24.1	26.3	24.8	14.6	13.5	7.7	16.5	17.3	14.1
BIG BEND													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	12.4	19.8	23.1	24.1	26.2	24.5	14.2	13.3	7.5	16.3	17.3	14.1
FORT RANDALL													
ELEV FTMSL	1353.7	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1342.3	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	8.3	12.6	21.0	24.1	24.7	26.4	27.4	27.9	18.1	7.5	11.0	11.8	7.3
GAVINS POINT													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.4	22.8	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	45399	45781	45616	44875	44201	43491	42551	41713	41326	41452	41200	41039	41293
ENERGY GWH		418.9	574.1	699.4	699.6	761.0	746.5	519.1	431.6	286.0	527.3	574.9	452.3

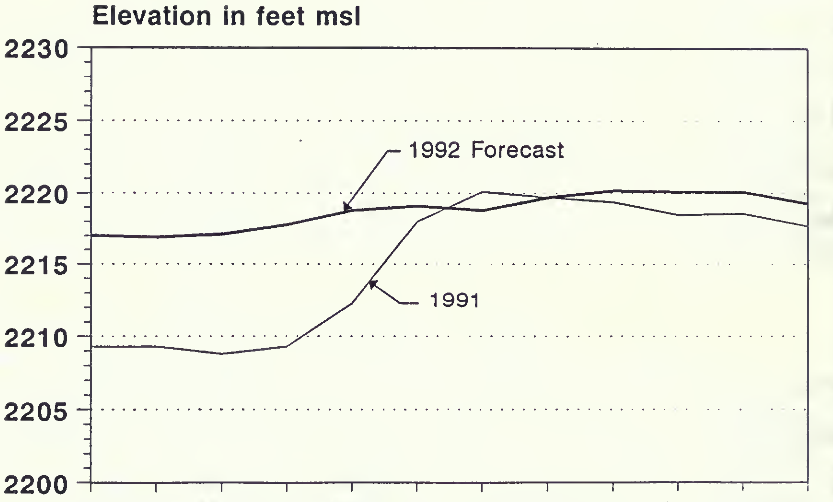
MARCH 1, 1992 ADJ LOWER DECILE FCST, FORT RANDALL FILLED TO 1356.5 BY MAY 31

	29FEB92	31MAR	1992 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2216.8	2215.3	2213.9	2213.1	2211.9	2211.3	2210.7	2211.0	2211.5	2211.7	2210.6	2208.7	2207.1
DISCH KCFS	7.4	7.9	7.9	6.6	7.0	7.0	7.0	4.6	3.7	4.5	8.0	10.5	10.5
GARRISON													
ELEV FTMSL	1820.8	1822.2	1823.6	1822.1	1821.4	1821.0	1820.2	1820.7	1820.8	1820.3	1818.1	1816.4	1815.5
DISCH KCFS	20.4	10.0	11.0	18.0	18.0	18.0	18.0	10.1	10.1	12.0	20.0	21.0	20.0
OAHE													
ELEV FTMSL	1591.5	1592.6	1591.0	1589.5	1588.9	1586.7	1584.7	1583.8	1582.8	1583.8	1584.5	1585.4	1586.9
DISCH KCFS	14.2	10.1	21.9	25.2	22.2	26.3	24.8	14.5	13.6	7.7	16.5	17.3	14.1
BIG BEND													
ELEV FTMSL	1420.8	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	13.6	10.4	21.9	25.2	22.2	26.2	24.5	14.2	13.3	7.5	16.3	17.3	14.1
FORT RANDALL													
ELEV FTMSL	1353.7	1353.7	1355.2	1356.7	1355.4	1355.4	1353.4	1342.6	1337.8	1337.8	1343.0	1348.1	1353.2
DISCH KCFS	8.3	12.6	21.0	24.1	24.7	26.4	27.4	27.9	18.1	7.5	11.0	11.8	7.3
GAVINS POINT													
ELEV FTMSL	1206.5	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1205.0
DISCH KCFS	10.9	14.4	22.8	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	45399	45781	45616	44871	44201	43492	42551	41713	41326	41451	41199	41039	41297
ENERGY GWH		393.4	598.9	732.7	678.0	761.1	746.7	518.8	431.7	288.0	527.2	574.8	445.2

Fort Peck

Pool Elevations

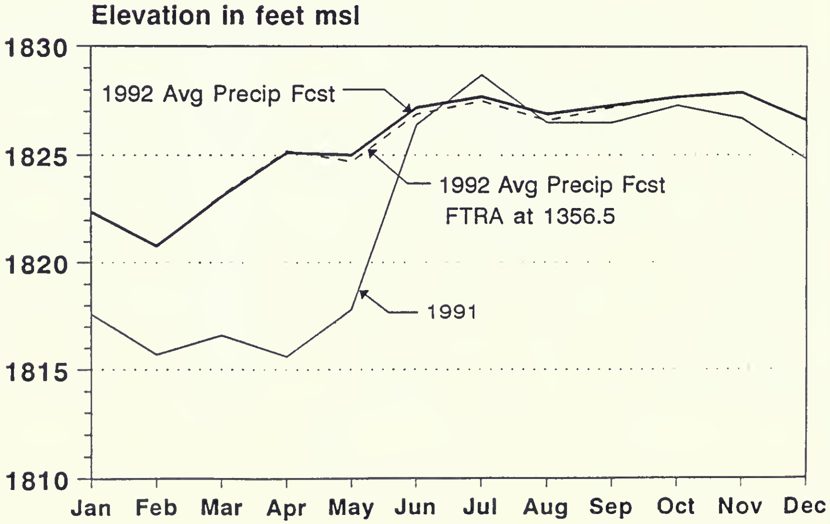
Avg Precip



end of month elev

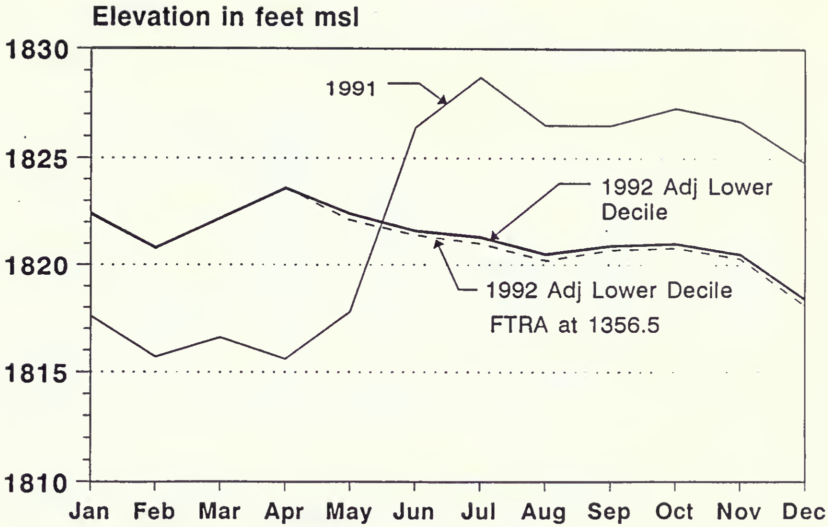
Garrison

Pool Elevations



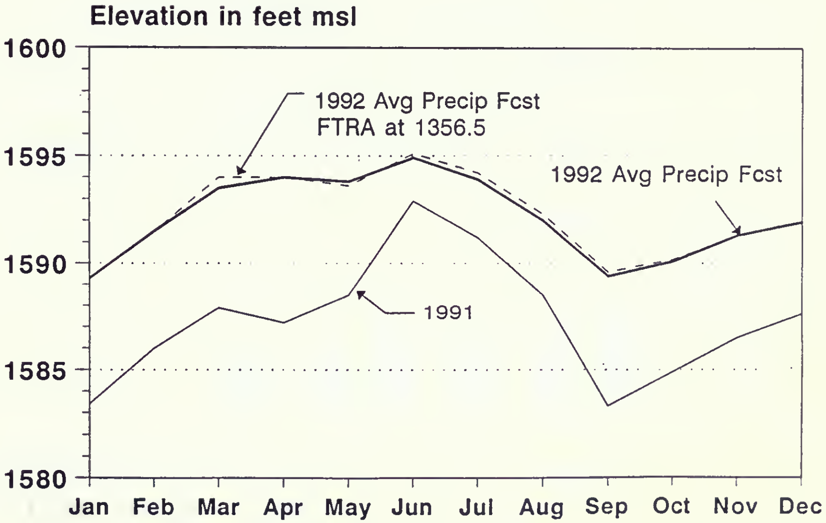
Garrison

Pool Elevations



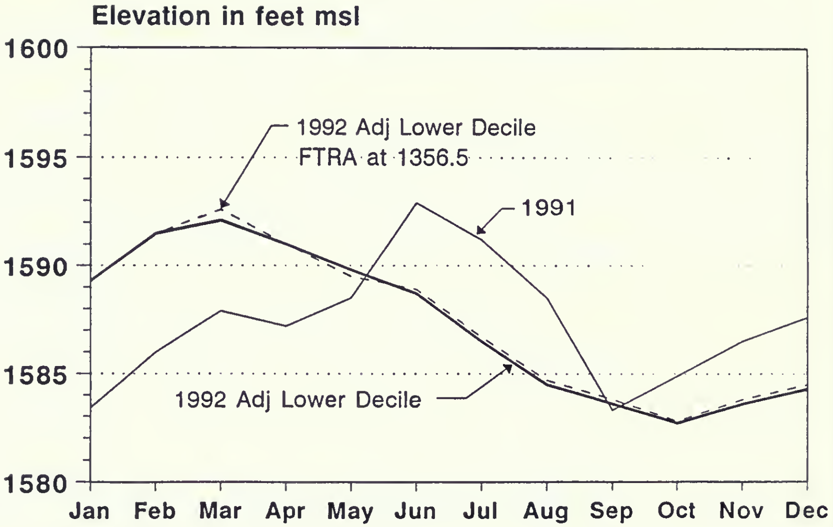
Oahe

Pool Elevations



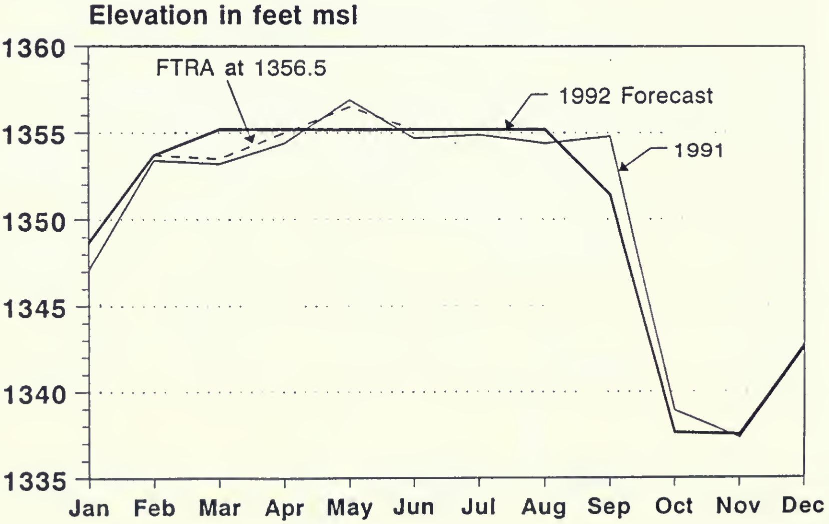
Oahe

Pool Elevations



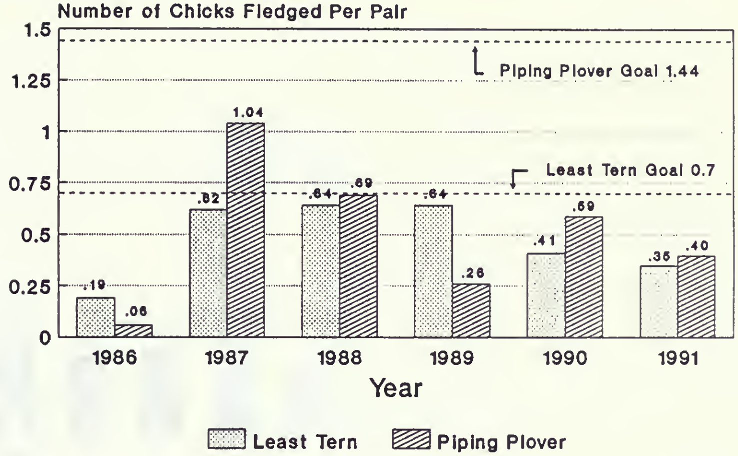
Fort Randall

Pool Elevations



Endangered Species Fledge Ratios

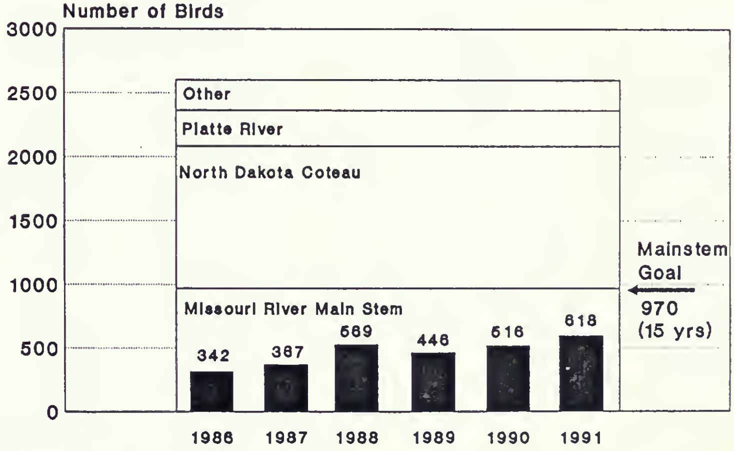
Piping Plover and Least Tern



Missouri River Main Stem

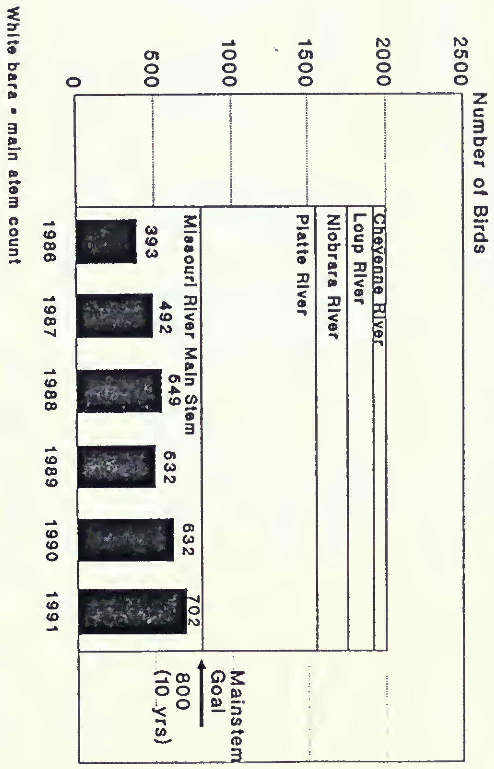
Adult Plover Population Goal

Missouri River & Tributaries



White bars = main stem count

Adult Tern Population Goal
Missouri River & Tributaries



White bars = main stem count

MEMORANDUM FOR RECORD

A meeting was held with the U.S. Fish and Wildlife Service at the Gavins Point Lake Visitor Center on 19 February to discuss Corps 1992 management strategies for interior least terns and piping plovers along the Missouri river main stem system. Meeting attendees included Joel Medlin and Stan Zschomler (U.S. Fish and Wildlife Service) and Howard Thelen, Duane Sveum, Dave Wooster, Gary Mick, and Dick Taylor (Corps of Engineers). (Agenda attached)

The following information was provided/discussed, and is keyed to the Agenda:

1.a. - Flow constraints for the 1992 operation:

Ft. Peck - 8,000 cfs avg. daily and peak hourly
Garrison - 21,000 cfs avg. daily/31,000 cfs peak hourly
Ft. Randall - 27,100 cfs avg. daily/36,000 cfs peak hourly
Gavins Pt. - 29,000 cfs avg. daily/29,000 cfs peak hourly

USFWS and the Corps ended up discussing this and Agenda item 1.d. at the same time. See 1.d for additional information.

1.b. - Island development downstream from Ft. Randall:

RM 875.0 - push existing sand to higher elevations
RM 869.0 - " " " " " " "
RM 866.7 - " " " " " " "
RM 853.8 - clear vegetation, push sand to higher elevation

USFWS was advised of how the work would be accomplished (National Guard and Ft. Randall Project). Additional development sites in this river reach are limited without creating new islands or impacting several islands containing large cottonwood trees near Fort Randall Dam which currently provide wintering bald eagle feeding perches. The long range plan for tern and plover habitat work on the Missouri River will address structural and other habitat development measures to serve this, as well as, other needs.

1.c. - Dredging/dragline to create higher islands on the Missouri River, Niobrara - Springfield reach:

RM 832.0 - 1/4 acre island/raise 2-2 1/2 feet
RM 832.8 - " " " / " " "
RM 833.0 - " " " / " " "
RM 833.1 - " " " / " " "
RM 840.0 - one acre island/raise 2-2 1/2 feet
RM 843.0 - " " " / " " "

The USFWS was advised that the Corps needed a 404 permit to do the island work and of the short timeframe we were working in before the birds start nesting. With this in mind, the USFWS recommended that first priority be given to the four islands from RM 832.0 through RM 833.1. USFWS acknowledged that work was also needed on the islands at RM 840.0 and RM 843.0, if time and funds allowed..

1.d. - Spiking releases every third day from Fort Randall and Gavins Point Dams. (Also see 1.a.)

Duane Sveum discussed the need to "spike" every third day to keep the birds from nesting at lower island elevations downstream from Ft. Randall and Gavins Point Dams. The decision on the level of the third day "spike" would be made just prior to bird nesting in mid-May and would be established based on the projected flows needed to meet downstream navigation targets in the late July/August timeframes. This period is when tributary inflows downstream from Gavins Point normally "dry up" and navigation targets require additional main stem releases.
There were several alternatives to the suggested Corps operation mentioned by the USFWS which it felt better served the birds: (1) Reducing the magnitude of the "spike", (2) "spiking" only early in the nesting season up to about 1 July, until the birds begin hatching, and then flat load releases to the higher third day level to preclude stranding young birds on low islands/sand bars, (3) reducing the high third day discharge to less than the 29,000 cfs (lower the better), and (4) holding the low two day discharge as a flat release until about 1 August, then increasing releases to serve navigation targets (This would likely result in a "take" of unfledged young and could be a Major Problem under the Biological Opinion and ESA. Reproductive data obtained since 1986. indicate some unfledged young have been on nesting areas until late August every year. The Corps should definitely think twice before entertaining consideration of this alternative).

1.e. Habitat development in other reaches

Gary Mick advised the USFWS that tentative habitat efforts downstream from Gavins Point Dam included chopping and hand pulling of vegetation, mechanical clearing/development of islands, and possible fall use of herbicide (Rodeo) on previously cleared islands. Actual sites for habitat development will be identified within the next two weeks. Funds for work in this reach will come from the Missouri Recreational River account.

The USFWS suggested the Corps might try dragging snags or floating logs up on low islands to encourage sand deposition and island raising. Snow fences were also mentioned.

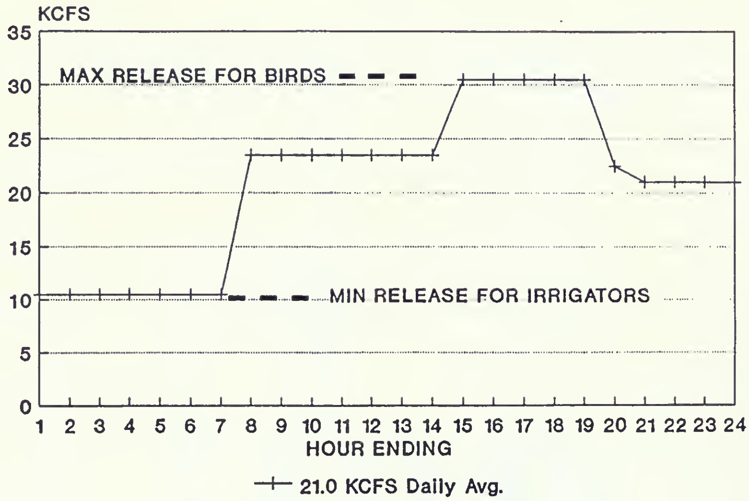
Similar discussions and timeframes were given for work downstream from Garrison Dam. The interest of the ND Game and Fish Department to raise Canada geese on vegetated islands downstream from Garrison has created some problems with vegetation removal for terns and plovers. A landowner's riparian rights bill introduced in last year's ND Legislature influenced the USFWS (and the State) not to call attention to river issues by clearing islands at that time. Coordination with the USFWS and ND Game and Fish is needed to overcome this management concern.

2. Operation target of 1206 msl for Lewis and Clark Lake

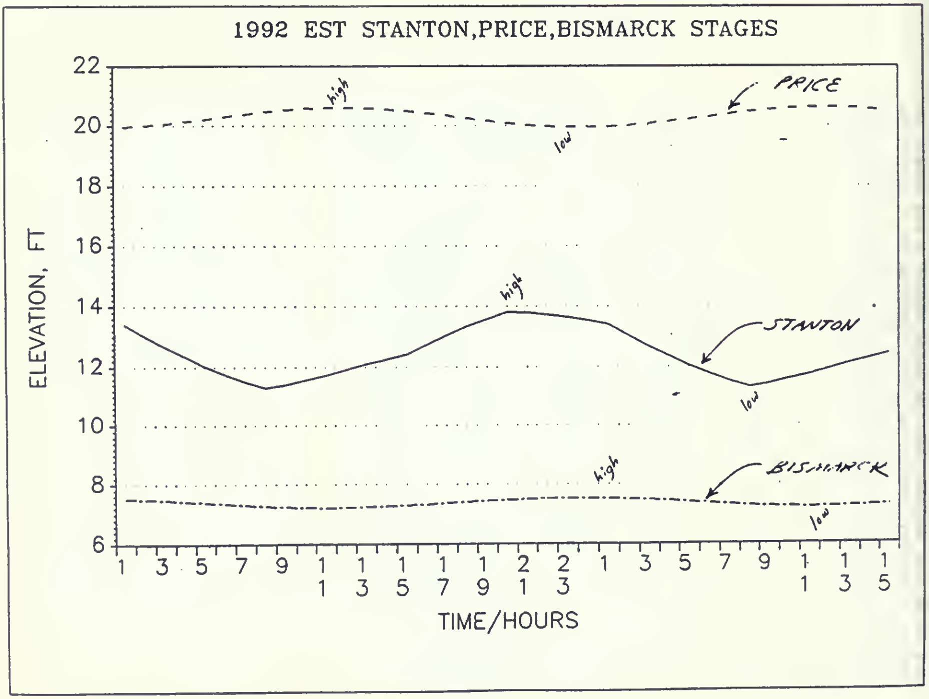
Raising Lewis and Clark Lake was discussed in detail by the Corps and the USFWS. The bottom line was that if there were nesting sites available above the 1206 msl elevation, (as a result of Corps research/experimentation efforts, mitigation, conservation, enhancement, or whatever you choose to call it) the USFWS would have no problem with the pool raise.

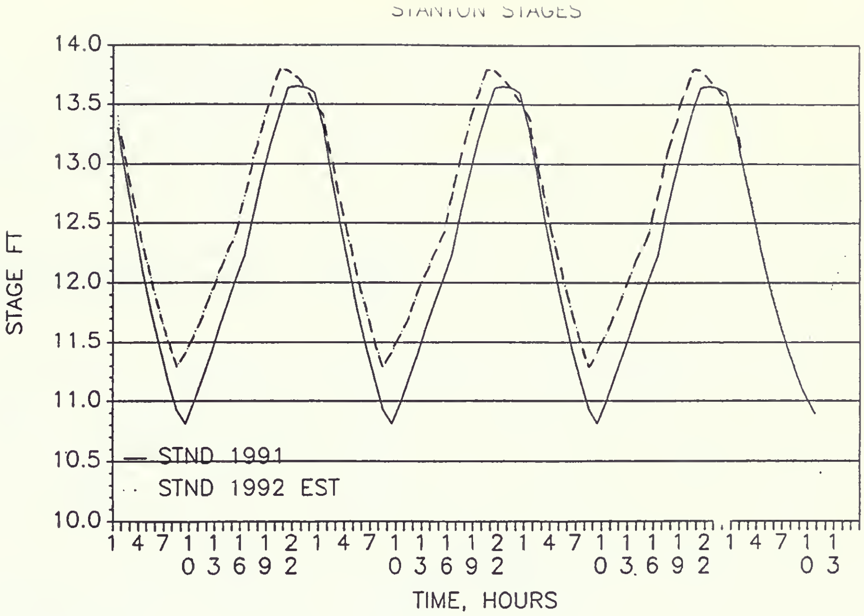
The meeting adjourned at 1630. All parties seemed satsfified with the outcome.

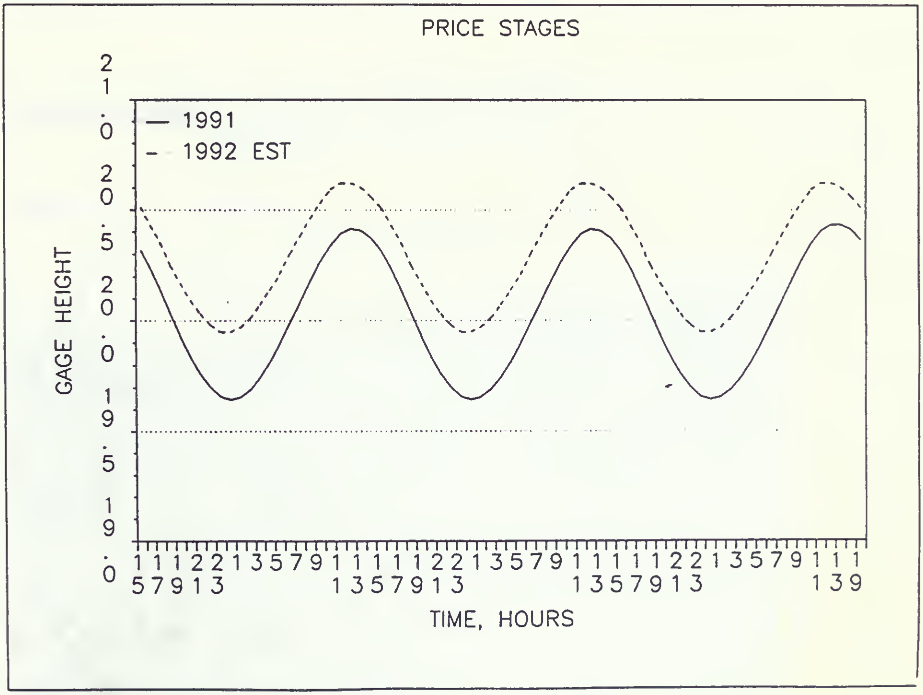
Dick Taylor
Chief, Environmental Resources Branch
Planning Division
Civil Works and Planning Directorate



21.0 KCFS = 286 KWh/cfs & 6000 MWh




STANTON STAGES
14.0
13.5
13.0
12.5
12.0
11.5
11.0
10.5
10.0
STAGE FT
— STND 1991
·· STND 1992 EST
1 4 7 10 13 16 19 22 1 4 7 10 13 16 19 22 1 4 7 10 13 16 19 22 1 4 7 10 13
TIME, HOURS


PRICE STAGES
21.0
20.5
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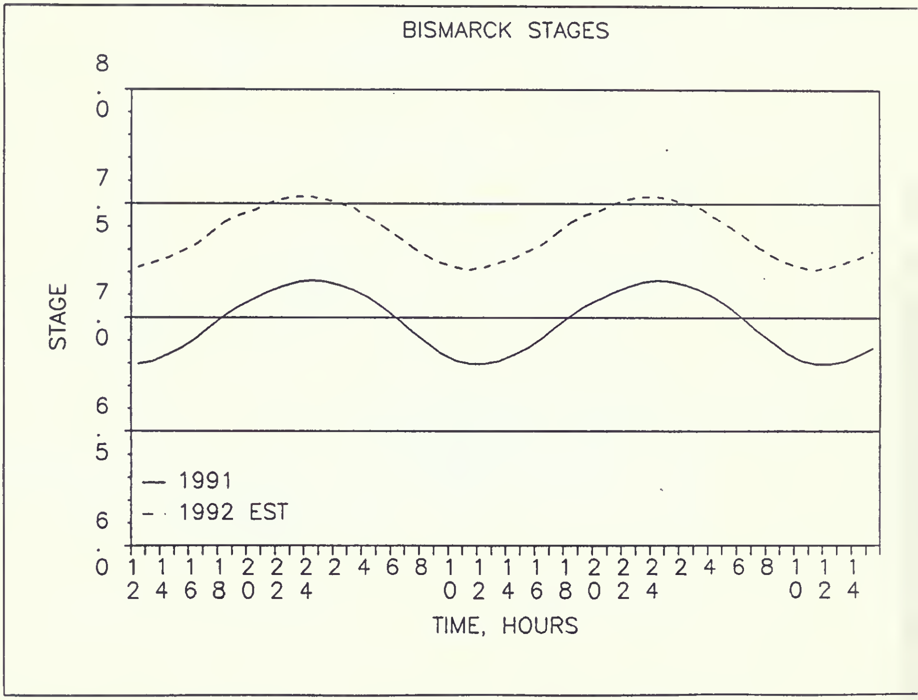
GAGE HEIGHT
— 1991
- - 1992 EST
15 17 19 21 23 1 3 5 7 9 11 13 15 17 19 21 23 1 3 5 7 9 11 13 15 17 19 21 23 1 3 5 7 9 11 13 19
TIME, HOURS


BISMARCK STAGES
STAGE
8.0
7.5
7.0
6.5
6.0
— 1991
- · 1992 EST
1 2
1 4
1 6
1 8
2 0
2 2
2 4
2
4
6
8
1 0
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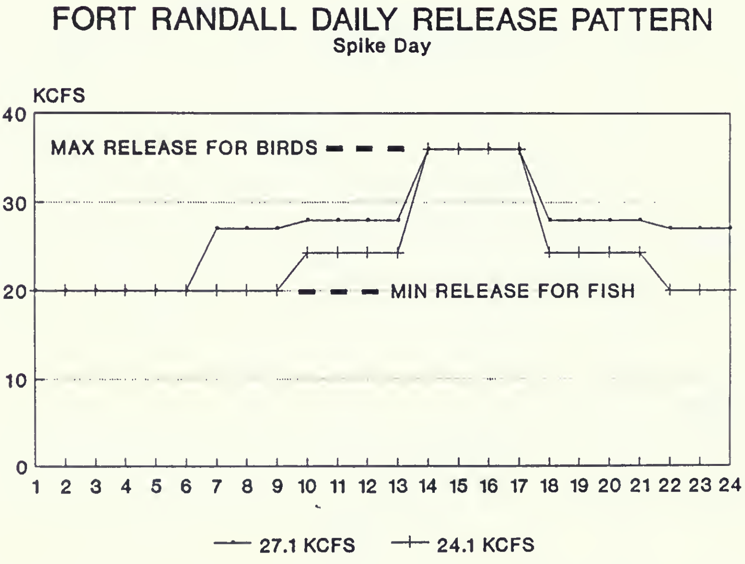
1 6
1 8
2 0
2 2
2 4
2
4
6
8
1 0
1 2
1 4
TIME, HOURS


FORT RANDALL DAILY RELEASE PATTERN
Spike Day
KCFS
40
30
20
10
0
MAX RELEASE FOR BIRDS
MIN RELEASE FOR FISH
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
27.1 KCFS
24.1 KCFS

RELEASE PATTERNS GAVINS POINT AND FORT RANDALL

	DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)
			1/2 MAY		
Gavins	24.8	24.8	28.2	=	25.4
FtRand	22.2	22.2	27.1	=	23.0

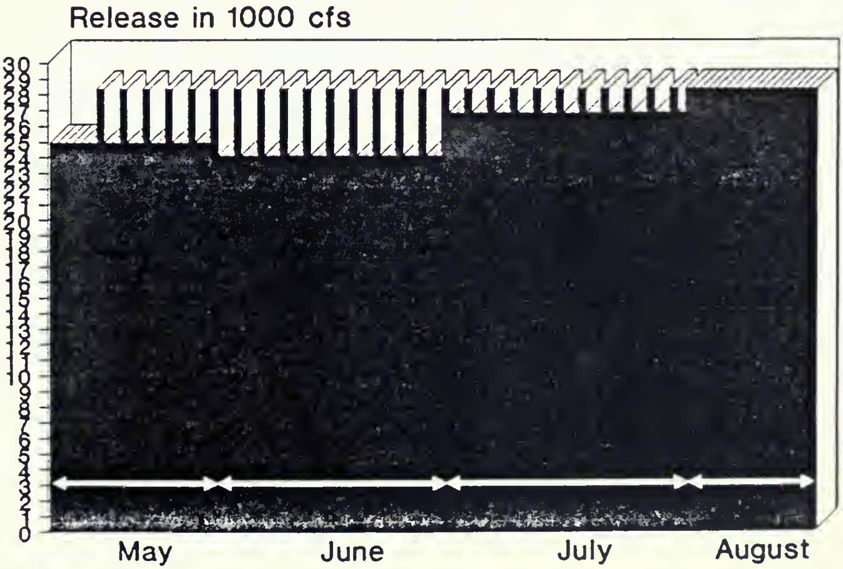
					2.4
			JUNE		
Gavins	24.0	24.0	28.2	=	25.4
FtRand	21.1	21.1	27.1	=	23.1

					2.3
			JULY		
Gavins	26.7	26.7	28.2	=	27.2
tRand	25.0	25.0	27.1	=	25.7

					1.5
			AUGUST		
avins	28.2	28.2	28.2	=	28.2
tRand	27.1	27.1	27.1	=	27.1

					1.1

Gavins Point Cycled Release
1992 March Forecast Plan



RELEASE PATTERN WORKSHEET FOR 1992 NESTING SEASON

(1)

DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)	TOT Q (maf)
		1/2 MAY			
24.8	24.8	24.8	=	24.8	0.787
		JUNE			
24.0	24.0	24.0	=	24.0	1.428
		JULY			
26.7	26.7	26.7	=	26.7	1.642
		AUGUST			
28.2	28.2	28.2	=	28.2	1.734

Total Gavins Point Water 5.591 maf

(2) ✓

DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)	TOT Q (maf)
		1/2 MAY			
24.8	24.8	28.2	=	25.4	0.828
		JUNE			
24.0	24.0	28.2	=	25.4	1.511
		JULY			
26.7	26.7	28.2	=	27.2	1.672
		AUGUST			
28.2	28.2	28.2	=	28.2	1.734

Total Gavins Point Water 5.745 maf

(3)

DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)	TOT Q (maf)
		1/2 MAY			
24.8	24.8	29.0	=	25.5	0.837
		JUNE			
24.0	24.0	29.0	=	25.7	1.527
		JULY			
26.7	26.7	29.0	=	27.5	1.689
		AUGUST			
29.0	29.0	29.0	=	29.0	1.783

Total Gavins Point Water 5.836 ma

(4)

DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)	TOT Q (maf)
		1/2 MAY			
24.8	24.8	28.2	=	25.4	0.828
		JUNE			
24.0	24.0	28.2	=	25.4	1.511
		JULY			
28.2	28.2	28.2	=	28.2	1.734
		AUGUST			
28.2	28.2	28.2	=	28.2	1.734

Total Gavins Point Water 5.807 maf

(5)

DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)	TOT Q (maf)
		1/2 MAY			
24.8	24.8	29.0	=	25.5	0.837
		JUNE			
24.0	24.0	29.0	=	25.7	1.527
		JULY			
29.0	29.0	29.0	=	29.0	1.783
		AUGUST			
29.0	29.0	29.0	=	29.0	1.783

Total Gavins Point Water 5.931 maf

(6)

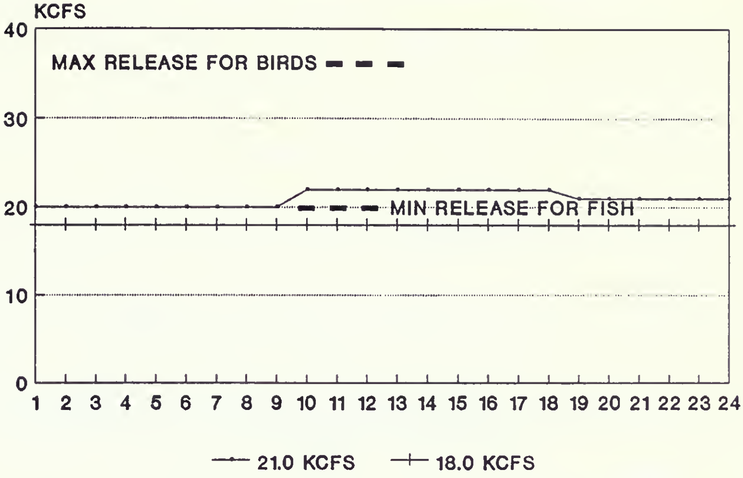
DAY 1 (cfs)	DAY 2 (cfs)	DAY 3 (cfs)		MON AVG (cfs)	TOT Q (maf)
		1/2 MAY			
24.8	24.8	26.7	=	25.1	0.810
		JUNE			
24.0	24.0	26.7	=	24.9	1.482
		JULY			
26.7	26.7	26.7	=	26.7	1.642
		AUGUST			
29.0	29.0	29.0	=	29.0	1.783

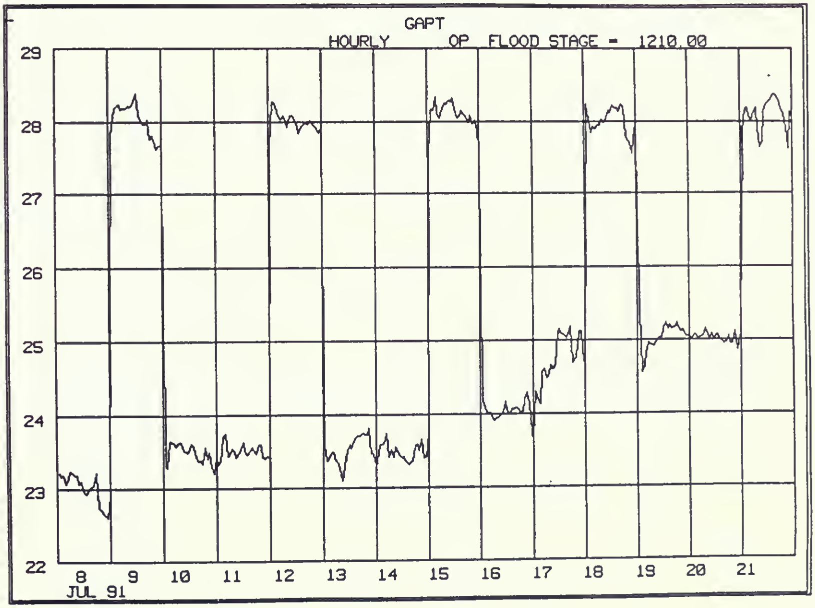
Total Gavins Point Water 5.716 ma

1' of July Stor: Oahe = 0.170
Garr = 0.260
Oahe = 0.270
Tot = 0.700 maf

FORT RANDALL DAILY RELEASE PATTERN

Low Day





BASED ON AVERAGE PRECIPITATION

March 1, 1992 USACE Projection

	31 March	30 April	31 May	30 June	31 July
Sakakawea	1823.1	25.1	25.0	27.2	27.7
Oahe	1593.5	94.0	93.8	94.9	93.9

Modified Operational Scenario

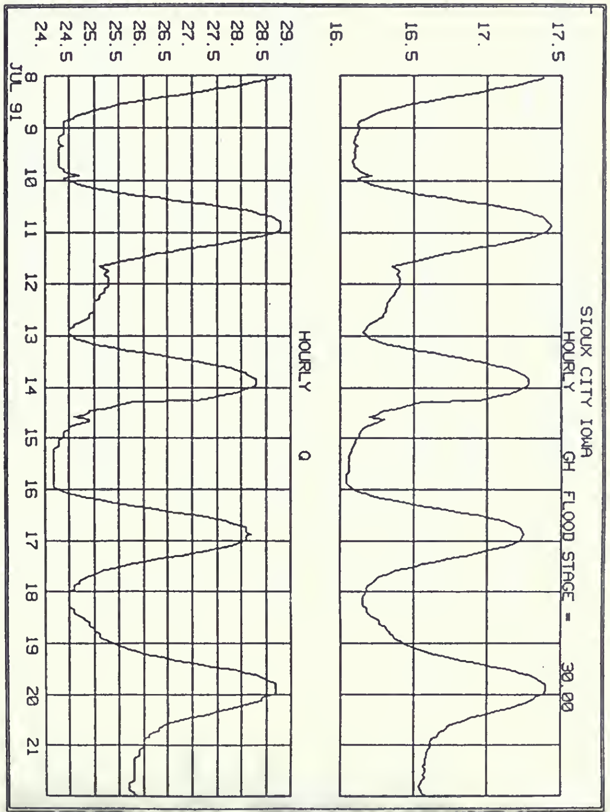
	31 March	30 April	31 May	30 June	31 July
Sakakawea	1822.1	23.6	23.5	26.0	27.0
Oahe	1594.5	95.5	95.3	96.1	94.6

PRIORITY BENCHMARKS

Oahe - reach 1595 ft msl by April 15 and remain above 1594.5 through July 31.

Sakakawea - reach 1825 ft msl by June 15 and remain between 1826 and 1829 between July 1 and October 31.

Greg Power
North Dakota Game and Fish Department



1991 Missouri River System (North Dakota) Highlights

North Dakota Game and Fish Department

FISHERIES

SAKAKAWEA:

- Relatively low incidence of 'sandy flesh' (myofibrogranuloma) in walleye.
- The frequency in which hybrids (of walleye/sauger) occur throughout the reservoir is approximately 22%.
- Rainbow smelt were the primary forage for walleye/sauger with the exception of a late summer six-week period when other forage species predominated.
- Paddlefish were the primary food item for walleye/sauger for one month in the upper portion of the reservoir.
- Documented fair to good paddlefish reproduction. The best year on record for overall forage reproduction.
- One of the poorest years of walleye reproduction.
- Five million walleye stocked; fair take.
- Only 650,000 chinook salmon eggs taken; population remains disease-free.
- No rainbow smelt die-off observed in 1991.
- 35% decline in fishing use from 1988.
- Successful implementation of 14 inch minimum for walleye/sauger.

MISSOURI RIVER:

- First intense effort of river sampling - 1600 hours of netting.
- Documented longnose sucker spawning run; walleye reproduction documented; collected twelve adult blue sucker and one juvenile paddlefish.

OAHE:

"Very little fishing use.

"Good walleye reproduction.

MISSOURI RIVER SYSTEM:

"Initiated a comprehensive planning effort (Participative Management)

WILDLIFE

*Enhanced sandbar habitat for terns and plovers (in cooperation with the USACE and USFWS).

*Population and reproduction surveys on the Missouri River (in cooperation with the USACE and USFWS).

*Jointly created/restored approximately 900 acres of wetlands adjacent to the Missouri River.

ADDITIONAL (UNIQUE) EFFORTS PLANNED FOR 1992

FISHERIES

SAKAKAWEA:

"Graduate study regarding paddlefish recruitment

"Implementation of a paddlefish tagging system.

"Ongoing collection of data for fish habitat document - coordinate with USACE and Indian reservations.

MISSOURI RIVER:

"Intense, habitat sampling for sturgeon spp.

WILDLIFE

- Erection of a bald eagle nesting platform along the Missouri River in cooperation with the Nature Conservancy.

- Establishment of I&E kiosks at boating access sites along the Missouri River (joint venture with Fisheries).

- Enhance sandbar habitat for terns and plovers (in cooperation with the USACE and USFWS).

- Population and reproduction surveys of terns and plovers throughout the Missouri River System (in cooperation with the USACE and USFWS).

- Ongoing joint efforts in wetland development and enhancement.

- Development of a watchable wildlife guide (sixteen sites along the Missouri River System).

SUMMARY OF FISH & WILDLIFE SERVICE BIOLOGICAL OPINION ON OPERATIONS OF MISSOURI RIVER MAIN STEM SYSTEM

CHRONOLOGY OF BIOLOGICAL OPINION DEVELOPMENT

4 MAR 86.	FWS comments on Corps' operations of Mo R Main Stem System. FWS requested Corps enter into formal Section 7 consultation.
8 APR 86.	Corps requested formal Section 7 consultation.
19 OCT 87.	Corps completed Bio Assess on ops of Mo R. Main Stem System.
20 NOV 87.	FWS requested additional information from Corps to prepare Bio Op.
26 MAY 89.	Corps provided additional information and considered this transmittal as initiating formal consultation.
13 FEB 90.	FWS provided Corps with draft Opinion for comments.
22 FEB 90.	FWS and Corps met in Pierre, SD to discuss Opinion.
15 MAR 90.	Corps provided FWS with comments on draft Opinion.
30 APR 90.	FWS incorporated Corps' comments into Opinion and another draft was sent to Corps.
13 JUL 90.	Corps provided FWS with comments on draft Opinion.
4 SEP 90.	FWS incorporated some of Corps' requested revisions and issued another draft Opinion.
2 NOV 90.	Conference call between FWS and Corps. Draft Opinion was finalized.
14 NOV 90.	FWS signed final Biological Opinion.

BIOLOGICAL OPINION SUMMARIZED

Endangered Bald Eagle - Not likely to jeopardize

Conservation recommendations:

1. Corps' project offices evaluate and map potential wintering and breeding habitat on the Missouri River.
2. Corps census breeding and wintering eagles on Corps property.
3. Corps' projects draw up and implement plans for protection, conservation, and restoration of eagles on Corps land.
4. Evaluate a potential hacking program on Mo R. If feasible, implement.
5. Closer relations between Corps and the FWS Karl Mundt NWR.

Endangered Interior Least Terns/Threatened Piping Plovers - Likely to jeopardize

Reasonable and Prudent Alternatives:

1. Manage flows and discharges such that:
   a. Operational-caused flooding should be avoided during breeding season. Flows set by nest initiation dates.
   b. Provide conditions to meet or exceed fledge ratio goals of 0.70 for terns and 1.44 for plovers.
      1. Proximity to forage habitat - terns nesting areas no >400 meters from forage areas. Plover nesting areas must include sandbar flats.
      2. Substrate - Fine sand nesting substrate.

3. Vegetation (at nest initiation) - Percent cover on sandbars <25 percent, optimum <10 percent.
4. Elevation of nests above river level - Nesting areas should be 8 inches or > above river levels.
5. Disturbance-free area - Nesting areas should be free of predation and human disturbance.

c. Create additional nesting habitat when release flows are as follows: Fort Peck-- >8,500 cfs & <13,200 cfs
Garrison-- >18,000 cfs & <31,000 cfs
Fort Randall-- >28,000 cfs & <38,500 cfs
Gavins Point-- >30,000 cfs & <39,500 cfs

2. Provide info and/or meet with FWS during development of the Corps' draft AOP to ensure Opinion objectives are met.
3. Annual report by December 31. Include in AOP outline of tern plover management actions. Allows for FWS and the Mo R Tern and Plover Management Team to evaluate effectiveness of Corps' actions. Report should include:
   a. Least tern and piping plover fledge ratios.
   b. Least tern and piping plover population survey results.
   c. Nest elevations.
   d. Map of nesting habitat, including changes in sandbar morphology during the nesting season.
   e. Sandbar acreages.
   f. Historic hourly release data from all dams, including water levels for all reaches for the May 12 to August 30 season.
4. Form a Missouri River Tern and Plover Management Team (Team). Corps will schedule and arrange Team meetings.
5. Map, every 3 years, all essential tern and plover nesting habitat used on the Missouri River. Maps in annual report.
6. Continue "Investigations of Channel Degradation" studies.

Conservation Recommendations:

1. Monitor tern/plover populations each drought year on reservoirs.
2. Maintenance dredging operations or permits (Section 10/404) should be evaluated, in consultation with FWS, for creating habitat.
3. Strive to meet Missouri River recovery goals of 800 least tern adults for 10 years; 975 piping plover adults for 15 years.

Incidental Take

Minimal incidental take of terns and plovers will occur as a result of system operations, even if reasonable and prudent alternatives are implemented. Take that is not likely to jeopardize the species is that which will not cause the fledge ratios to drop below 0.70 (terns) and 1.44 (plovers).

Reasonable and Prudent Measures Necessary to Minimize Take:

1. Monitor nesting habitat on riverine reaches below dams, including headwaters of Lewis and Clark Lake, as well as reservoir areas during long-term droughts to determine fledge success and total number of adult birds.

2. Monitor daily/hourly fluctuations of dam releases to avoid unnecessary take and document unavoidable taking.
3. Continue to evaluate operational changes used to avoid take.
4. Implement public info and education to increase public awareness.

Terms and Conditions That Implement the Reasonable and Prudent Measures:

Measure No. 1 - Productivity and population surveys on riverine reaches will be conducted each year (reservoirs surveyed during drought years).

a. Population surveys shall include:
   1. Total number of colonies.
   2. Total number of birds.
   3. Map of areas used for nesting (includes sandbar acreages).

b. Productivity estimates will include:
   1. Total number of nests.
   2. Fledge ratios.
   3. Causes of nest and chick loss.
   4. Elevation of nests above water levels and distance to water's edge.

Measure No. 2 - Document and report to FWS all incidence of take.

Measure No. 3 - If new operational scenarios, that were not considered during this consultation, are developed, then consultation will be reinitiated.

Measure No. 4 - Implement the following actions:

a. Production of Public Service Announcements.
b. Corps' project offices will engage in intensive public relations efforts.
c. Post and rope all nesting areas on the Missouri River.

Procedures for Handling or Disposing of Least Terns and Piping Plovers:

All eggs, chicks, or adults found dead on the Missouri River will be reported to FWS immediately (within 24 hours).

Annual Report

In regard to Reasonable and Prudent Measures 1 through 3, in addition to those items identified in Reasonable and Prudent Alternative 3, the Corps will include the following in the annual report:

a. Any taking, including reasons for take and actions to avoid take.
b. Evaluation of operational efforts to avoid take.

Summary - Consultation Reinitiated

1. If new info becomes available.
2. If new species are listed.
3. System design/operation is modified.
4. Reasonable and prudent measures/alternatives not carried out.
5. Fledge ratio goals not met.
6. Revision of Master Manual.

Report for MRNRC

Paddlefish Listing/CITES

The paddlefish was petitioned for federal listing as Threatened in July of 1989.

The Status Review was completed in December of 1990.

Dave Allardyce, FWE, Pierre, started on the one year finding as well as a CITES petition in Jan. of 1991.

The Listing

The one year finding completed by Dave, went into the Service's Regional Office in Denver on May 1 of 1991 for regional review and for review by DOI's Solicitor's Office.

Upon redraft after this first review, a second review for the Solicitor's Office was intitiated in Oct. of 1991. This is the stage that the petition process is currently at.

Dave estimates that the one year finding will go to Washington sometime in July of 1992 where a final decision will be made. The Service's findings and decision on whether or not to list the paddlefish as threatened will then be posted in the Federal Register for comment. After the comment period, providing no revelations occur which are not expected at that point in the process, the determination will be final. Dave estimates this will occur in late Fall of 1992.

Although not official yet, the Service will recommend that the paddlefish not be federally listed as Threatened. The one year finding revealed that:

- listing is not warranted throughout it's range and,
- a lack of genetic information precludes definition of distinct populations and, therefore, listing of individual populations

The finding does, however, recommend that the paddlefish's status be changed from Category 3 to Category 2 which should stimulate more research on the species. Incidently, this status change has already been accomplished.

C1, C2, C3 - Federally listed as a candidate species; species recognized as potential candidates for listing but offered no protection under the Endangered Species Act. Candidate species are subdivided into three status categories:

Category 1 - Species for which the Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Also included in category 1 are species of known vulnerable status in the recent past that may already have become extinct.

Category 2 - Species for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time. Further biological research and field study usually will be necessary to ascertain the status of the species.

Category 3 - Species that once were considered for listing as threatened or endangered but are no longer under such consideration. Category 3 species are not candidates for listing and are further subdivided into three subcategories to indicate the reason(s) for their removal from consideration.

CITES

A proposal to include the paddlefish as an Appendix I species under CITES, went into the Service's Regional Office in Denver in Feb. of 1991. Appendix I classification would essentially ban international commercial trade of paddlefish parts and eggs. It would also require that a management plan be completed by individual States having commercial operations within the U.S.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES or Convention) regulates international trade in species of animals and plants listed in its appendices I, II, and III.

- Appendix I includes species threatened with extinction that are or may be affected by trade.
- Appendix II includes species that although not necessarily threatened with extinction may become so unless trade in them is strictly controlled. It also lists species (as look-a-likes) that must be subject to regulation in order that trade in other currently or potentially threatened species may be brought under effective control. The amount of trade that a species can sustain without threat of extinction generally will be greater for species in Appendix II than for those in Appendix I. Appendix II serves in part as a monitoring tool to gather trade data.
- Appendix III includes species that any Party nation identifies as being subject to regulation within its jurisdiction for purposes of preventing or restricting exploitation, and for which it needs the cooperation of other Parties in controlling trade.

The Convention is made up of 113 countries that meets at least once every two years. CITES requirements state that amendments to the Appendices must be submitted to the Secretariat (who is provided by the Executive Director of the United Nations Environment Programme) 150 days before the meeting so it can go though a review process. Amendments shall be adopted by a two-thirds majority vote. Amendments adopted at a meeting shall enter into force 90 days after that meeting. Amendments may be proposed between meetings by a postal procedure.

The Convention meets this year March 2-13, 1992 in Kyoto, Japan, therefore, the Service was required to submit the paddlefish proposal by Oct. of 1991. During the review period, the proposal for inclusion of the paddlefish into Appendix I of CITES was posted in the Federal Register requesting public comment until Feb. of 1992. During this period, the Service changed it's position, requesting inclusion of the paddlefish into Appendix II instead of Appendix I.

From communications during the status review and later, Dave theorizes that strong international pressure against Appendix I inclusion because of Montana and Tennessee's commercial trade, prompted the change in position.

Unfortunately, Appendix II will probably not afford the paddlefish much protection according to law enforcement officers. They feel that only species under Appendix I can be afforded any real protection by them. Considering enforcement manpower, little will be done to protect the species under Appendix II. However, under Appendix II, commercial trade is monitored. If it is found that commercial trade is harming the population, the proposal can be resubmitted for inclusion under Appendix I.

The Outcome of this 3 Year Process

Although the paddlefish will not be listed or will not be afforded the protection provided under Appendix I of CITES, the whole petition/CITES process has been of some benefit to the species.

- Attention has been drawn to the paddlefish.
- States have become more aware of the species status and the need for protection.
- The paddlefish is now classified as a C2 instead of C3 species so more studies will no doubt be done.
- The one year finding revealed that 20 of the 22 states in which the paddlefish occurs, have recognized that problems exist and within the last 3-5 years, have changed their policies by either restricting or terminating harvest, and have implemented status reviews and/or management plans.
- Pennsylvania just stocked paddlefish into some rivers (on the periphery of the paddlefish's range) where the species was considered extirpated.

Dave Allardyce will be giving a presentation on this information at the AFS annual meeting in Rapid City in Sept. of 1992.

Draft Minutes

Missouri River Natural Resources Committee
Sixth Annual Summer Meeting
August 4 - 6, 1992
Ramkota Inn, Pierre, South Dakota

August 4:

Chairman Dennis Unkenholz, South Dakota Delegate, distributed a finalized agenda, welcomed MRNRC delegates and representatives, members of MBSA's AOP Technical Subcommittee, Tribal representatives, and others in attendance to Pierre, and called the meeting to order. The agenda and a list of attendees are attached.

Kent Keenlyne, MRNRC Coordinator, dispensed a summary of Master Manual EQ input material (see attachment list) that the Fish and Wildlife Service (Service) will use in EQ Plan preparation. He briefly mentioned that a sturgeon/paddlefish workshop report, generated by Service personnel out of Panama City, was available and that he had attended a lower Mississippi River organizational meeting in Vicksburg, Mississippi, in April.

Duane Sveum, Corps of Engineers (Corps), distributed a report titled "Missouri River Main Stem Current Hydrologic Conditions" (see attachments list). He noted a change that the preliminary forecasted annual runoff needed to be changed from 16.5 MAF to 17.1 MAF and the word "preliminary" needed to be eliminated (page 1, paragraph 2). Additional revisions mentioned included changing July's predicted runoff from 54 percent of average to actual runoff of 101 percent of average (page 5, second graph) and changing the actual amount of runoff so far this year from 9.2 MAF to 12.4 MAF (page 6, first graph). He indicated his handout was for general informational purposes and that Dave Wooster, Corps, would follow with details.

Wooster circulated copies of Corps' data compiled for the meeting (see attachment list). He recounted that the new forecast (after recent rains in July) was 17.1 MAF which still placed the basin in its sixth year of drought. System storage was at 45.5 MAF. Although heavy rains were experienced in the lower basin, inflow into Fort Peck and the upper basin had been extremely low. As a result, they were unable to allow for rising water levels in Lake Oahe for fish spawning as was hoped and the reservoir experienced a decline in elevation of 1.5 feet. He mentioned they had been releasing between 23,000 and 24,000 cfs with a spike of 29,000 cfs every third day through mid June from Gavins Point Dam. Because of the recent rains in the lower basin and increased runoff, terns and plovers had been found nesting within one inch of the waters edge. After consultation with the Service, flows were decreased to a constant 23,000 cfs. As of this meeting, flows had been decreased further to 22,500 cfs. Because flows will need to be increased at some point, flow increases will occur at no more than 500 cfs increments per day to prevent nest and hatchling losses. Releases of 20,000 cfs at Fort Randall Dam and 7,900 cfs at Fort Peck for spawning were attained.

Because the Corps' forecasts were slightly off, a re-evaluation showed that much less water would be needed from Ft. Peck and Garrison in the fall which should result in increased system storage. Wooster presented the Corps' UNET Model, which can project water surface elevation at different river miles depending upon release amounts. He indicated that most terns and plovers in Montana nest near the Poplar River between river mile 1701 and 1621. Using the model, the effects of five release patterns from Ft. Peck Dam on downstream elevations where the birds nest were illustrated. Richard Schirk, WAPA, explained how the various release patterns would affect power production and that trade-offs would be necessary between the various interests. Wooster referred to a letter they had received from Montana about the need for 7,800 cfs from the dam to get 250 cfs at their rainbow side channel for spawning. The letter stated that, because the flows had been decreased for terns and plovers, the side channel had de-watered. Wooster stated that the Corps had honored Montana's request April through July but needed flexibility in release patterns to allow for all needs. The Corps would prefer to use mechanical means to insure side-channel watering as opposed to using flows from the dam. They will be requesting ideas from Montana on mechanical methods that could be used to accomplished this.

Wooster talked about release patterns at Garrison and Oahe Dams. Questions arose about the need for peaking. Stan Mason, WAPA, explained that peaking was very necessary for power production and that WAPA required a minimum of 100 megawatts just for irrigators in that area. He believes that peaking out of Fort Randall Dam every third day has proven to be a good compromise that meets both power and bird needs. Wooster stated that the Corps is obliged to do reservoir habitat work when daily release rates are within certain windows for each reservoir. He explained that these windows are reached when daily release rates are between a low point, under which abundant sandbar habitat already exists, and a high point, above which too much water would make habitat work infeasible. He mentioned that Garrison was within that window this summer, but no work was done. The Corps will be adjusting storage reservoir water levels by decreasing releases from the upper two even if 85 percent runoff occurs. He predicted that no rises will occur in reservoir elevations in 1992 as was experienced in 1991. He discussed Option 1, the 1992-1993 AOP Basic Forecast, which follows Master Manual guidelines.

The Corps' preliminary AOP regulation figures for 11 options, developed by MBSA's AOP Subcommittee, were discussed (see attachment list). The AOP Subcommittee reported they had narrowed the 11 options down to three options and would submit these to MBSA's executive board.

Bob Keasling, Corps, explained that the subcommittee had selected Options 1, 4, and 5. Jim Brown, Iowa Dept. Natural Resources, was asked to explain their selection rationale. He explained that MBSA's executive board had requested a narrow range of options from the subcommittee. To narrow the field of options, they decided to go with one option that repeated the previous year's recommendation (Option 4), one that favored downstream states (Option 1), and one that favored the upstream states (Option 5). When asked why they had disregarded Option 9, split navigation, they reasoned that this would be unacceptable for power interests as power demands increase in the summer and peaking is needed to generate sufficient power. Moreover, they reasoned that decreased system storage would result because more water is required to supply navigation in the fall than in the spring. Keasling stated that he will be calculating and distributing revised forecasts of the three chosen options with five-year extensions by Aug. 22 as requested by the AOP technical subcommittee.

Colonel Schaufelberger, Division Engineer, Missouri River Division, introduced himself and explained that it is the Corps' responsibility to be good stewards of the land they manage, and their focus is on running the system to balance all interests. He stated that no Corps' reorganization was in the works at present but feels some type of change will no doubt take place in the near future. Greg Power, North Dakota Delegate, mentioned that at Garrison, the Corps has been great to work with and that dialogue between the agencies was important. When asked if grazing was an authorized project purpose and, did the Corps plan to fence reservoirs to prevent erosion, he answered that it would be too expensive to fence but grazing could be regulated. He explained that they do habitat improvement work as well as mitigation work to benefit wildlife and prevent erosion. He emphasized that the Corps needs to work with others to identify potential projects. He explained that each reservoir has a master plan, including maps detailing specific uses for all land around the reservoirs. The master plan is looked at every year, reviewed periodically (possibly every 10 years) for applicability, and could be revisited if the planned uses are invalid or need to be changed. Unkenholz inquired as to why interagency meetings were not held anymore as in the past. Schaufelberger agreed that meetings of this type would be beneficial and promised to check into it. He was asked about the status of the Master Manual review. He reported that economic and environmental models are working and an Initial Evaluation Report will be completed by Sept. 1 and sent to MBSA and others for review. If a review of the models determine that they are not valid, the Corps will have to go back to the drawing board. If they are deemed valid, the EIS will be completed and sent out in draft for comment around January of 1993. The final EIS may indicate that a change in the Master Manual is warranted.

Gene Zuerlein, Nebraska Delegate, distributed a report titled "1993 Annual Operating Plan - Missouri River - Recommendations" by Larry Hesse and Gerald Mestl (see attachment list). He urged everyone to read it before making AOP recommendations. He explained that the report presents evidence dispelling the conventional idea that certain flows and dam releases below Gavins Point were necessary. Cross sections of the channel reveal few areas where floating barges would be a problem at lower flows. These few areas could be structurally modified decreasing flow requirements. In addition, it is thought that power plants along the river require certain flows for dilution of heated release water to meet water quality standards. The report shows that no detrimental impacts to flora and fauna occur from higher temperature releases. The report illustrates that a split navigation scenario is a feasible possibility and worth considering.

Gordon Farabee, Missouri Department of Conservation, read a letter from Missouri's delegate, Norm Stucky, in support of a split navigation season operation scenario.

Tom Gengerke, Iowa Delegate, speculated that endangered species will drive system operations in the future resulting in decreased operation flexibility and mandatory operational changes. Consideration should be given to the split navigation option as the best way to avoid species from becoming listed.

Steve Adams, Kansas Delegate, expressed support for the mimicking of natural hydrograph flows in an attempt to stem the decline of natural habitat along the river. He mentioned that a split navigation option, however, could decrease storage in the reservoirs.

Chris Hunter, Montana Delegate, indicated interest in the split navigation option but questioned whether or not enough potential habitat still existed along the lower river to benefit from natural hydrograph flows. The trade-off, decreased storage in the reservoirs, would be justifiable if sufficient downstream habitat would benefit from natural hydrograph flows.

Power stated that North Dakota still supports a split navigation option. However, if that option is disregarded, the state would recommend that navigation be delayed as late as possible to allow for spawning in the reservoirs.

Unkenholz would like to see rising water levels in the reservoirs to benefit spawning and supports operating the reservoirs in an unbalanced pool approach to periodically submerge shoreline vegetation.

Roger Collins, Service, spoke up in support of a split navigation season as a means of avoiding endangered species conflicts and to benefit habitat along the river.

Mason agreed that fishing needs were an important, viable consideration, but Nebraska must keep in mind that the river supplies 35 percent of their power allocation in the summer. He stated that power production from the system is a $4.4 billion business. He explained that WAPA requires 1,600 megawatts, the regular amount generated in winter, to meet their marketed requirements and additional power generated in the summer can be sold as surplus.

Both MRNRC and MBSA Subcommittee representatives in attendance expressed gratitude for the benefits both groups derived from each other's input and knowledge. The combined meeting illustrated to all present the validity of both group's concerns. Mason voiced interest in attending future MRNRC meetings and Richard Schirk, WAPA, also indicated that he will be attending future meetings.

Brenda Schilf, MBSA's AOP Subcommittee Chairman, indicated they sought MRNRC's endorsement of one of their three selected options by the end of the combined meeting. After discussion, it was decided, at this point in the meeting, the MRNRC was not prepared to make a final AOP recommendation decision and to defer further discussions/decisions until the next day after delegates had the opportunity to comparatively review the options.

August 5:

Doug Latka, Corps, distributed minutes from the first meeting of the Tern and Plover Management Team held on July 9 in Pierre (attached). They plan to meet again in September to set goals and objectives and to define the mission of the Team. Hunter indicated that clarification of the Team's role was needed to resolve tern and plover management recommendation conflicts, such as those recently experienced in Montana. It was mentioned, if participation on the Management Team was mandatory, then the Corps or the Service should pay for travel. Schilf remarked that the Tern and Plover Management Team needs to be more aggressive at encouraging tribal involvement.

Mark Harberg, Corps, reported that the distribution of Master Manual (MM) information goes through MBSA's technical subcommittees. The chronology of MM review events is as follows: (1) Initial Evaluation Report (IER) to be completed by Sept. 1; (2) MBSA to host meeting approximately five weeks after completion of IER, with technical subcommittees acting as panels to answer executive board questions; (3) Meeting with Service; (4) Final evaluation of alternatives for the Environmental Impact Statement (EIS) in November or December; (5) Draft EIS to be completed in January of 1993; and, (6) Final EIS complete with a preferred alternative in early 1994. The possibility of including a structural alternative that would utilize mechanical means to change channel characteristics to decrease flow requirements was questioned. The Corps indicated that an alternative of that nature would not belong in the EIS.

Unkenholz reintroduced the subject of the AOP recommendation by asking delegates if the Committee could support one of the 11 options or if they should formulate one of their own. Wooster emphasized that the Corps will continue to follow current wildlife operation practices under all scenarios. After much discussion, the group agreed that the Committee should concentrate on a natural resource recommendation and not attempt to accommodate all interests. Adams proposed that the Committee consider Option 9, but not necessarily as written. Hunter proposed that the Committee consider Option 9 but amend it so the low flow period is from Aug. 1 to the end of Sept. (8 weeks) and describe it as an option that follows a natural hydrograph as opposed to calling it a split navigation season option. Gengerke seconded Hunter's proposal to support Option 9 as amended. It was voted on and a consensus reached. The Corps will run the amended option and mail out the results. The recommendation letter to the Corps should explain the Committee's rationale (objectives) behind the decision including: the desire to achieve natural hydrograph flows, increase system storage, and the wish to protect terns and plovers. Support for storage trade-offs between the three reservoirs to submerge shoreline vegetation and benefit fish spawning should also be included. Sveum stated that November first is the latest date to get something into the draft AOP (it comes out in print in mid-March). It was decided that state reports should be included with the recommendation as in the past. Delegates should send their state reports to the Coordinator by mid-September to meet the November first printing deadline for AOP inclusion and should use the format that was used in the past.

Schilf restated the MBSA AOP Subcommittee's desire that the two groups come up with a common recommendation. The Committee concluded that it was appropriate for the two groups to have different recommendations since they are both charged with different responsibilities and are sensitive to different issues. However, the Committee emphasized that the benefits of this year's coordinated meeting were very beneficial and should continue in the future with coordination initiation starting earlier.

Dick Ruelle, Service, reported on Missouri River contaminant studies he has been involved with. Whole body and organ contaminant analyses have been done on various fish species including paddlefish, blue sucker, shovelnose and pallid sturgeon, carp, and carpsuckers from various river reaches. A number of contaminants, including selenium, DDT, DDE, DDD, PCB's, mercury and arsenic, have been found, some at elevated levels. It appears that some species accumulate certain contaminants more readily than other species and that certain internal organs concentrate particular contaminants more readily than others. In some cases the contaminant source is apparent; in others it is not. Elevated levels of certain contaminants have been shown to affect reproduction and can intensify from one species to the next in the food chain. Presently, contaminants work on the river has been sporadic, unstandardized, and reactively done in response to human concerns. Ruelle would like a comprehensive, basin-wide contaminants study done to identify hot spots, determine biological impacts of hot spots, and track important contaminants through the system. His study proposals for 1993 include main stem fish and sediment analyses, tributary fish and sediment analysis, and endangered species analyses. He emphasized that no one state or agency could afford to fund an entire system-wide study but it could be accomplished as an interagency effort. The EPA's NAWQA program was mentioned as a way of obtaining valuable contaminants data. **A decision was made to send a letter to the U.S. Geological Survey requesting that the Missouri River be included in their NAWQA program in 1994. The Coordinator will draft a letter for Zuerlein, the new chairman, to sign.**

Farabee reported on the commercial catfish season closure in Kansas, Nebraska, Iowa, and Missouri. The decision was made as a result of pre-closure creel surveys in 1991 and 1992. It is now the state's responsibility to assess the impacts. They plan to conduct post-closure creel survey's in 1995 and 1996. The goal is to have 20 percent of the fish sampled to be 15" (legal size) or longer by 1997 (five years after closure). If this goal is reached, reopening of the season might be considered. Many commercial fishermen were opposed to closure but have now accepted it, and many are hopeful that the season will reopen again.

Farabee gave an update on Missouri's Missouri River mitigation projects and stated that the state could receive $30 million or more in mitigation money. Phase I of their first project, Grand Pass (RM 266-272), was completed in March of 1992, involved 4,711 acres, and cost $202,293. It involved side channel and chute restoration, main channel habitat enhancement, and spawning and nursery development. Phases II, III, IV, and V will involve restoration of a 200 acre oxbow lake, acquisition of 212 acres for wetland development, and 100-acre island and chute acquisition, respectively. Another project, Howell Island Mitigation Project, is largely a waterfowl project with some fishery values. A fact sheet has been written and the Corps' Kansas City District is reviewing the project. Additional acquisition is planned for FY 93 and 94.

Harold Tyus, Service, explained that the Nonindigenous Aquatic Nuisance Species Act was passed in 1990 largely because of the zebra mussel and the brown tree snake. He believes the Act is good, although the section that deals with intentional introductions could be controversial. He identified some current nuisance species of concern including ruffe (competes with yellow perch), rudd (hybridizes with the golden shiner), spiny water flea, and the zebra mussel. Zebra mussels were first introduced to this country via ballast water of ships and were first found in Lake St. Claire in 1980. By 1990, damage caused by infestation has been significant. They are filter feeders and are extremely prolific. In some infested areas, water clarity has increased from one foot to 14 feet. It has been theorized that the entire contents of Lake Erie are circulated through zebra mussels every 14 to 15 days. Researchers are seeing conversions of complete ecosystems as a result.

Researchers believe that more than one species of zebra mussel might exist and have identified another species called the quagga mussel in Lake Superior. Zebra mussels spread easily because of their free-swimming veliger stage that can attach to almost anything, can detach if conditions are not favorable, and can reattach somewhere else. Although the most significant impact has been clogged water lines and intake structures, the effects to aquatic systems are uncertain. Control methods have not been perfected yet. The methods presently in use are chlorine, hot water, or mechanical means.

Zebra Mussels have been found in the Mississippi River close to the mouth of the Missouri River. It is predicted that three quarters of the U.S. could support zebra mussels. The question is not if they will infest the Missouri River but when they will. A task force has been formed which includes representatives from the Corps who will develop control methods, the Coast Guard who will regulate ballast water, and the Service who will study the biological and environmental impacts. Tyus explained that he is trying to coordinate activities in this region and would like the Committee to become involved. At present, facilities at risk and finding ways to deal with problems that arise need to be identified. A group discussion of the issue revealed that some Missouri River states are actively involved with zebra mussels and have put up signs at boat ramps, distributed informational flyers, and have zebra mussel coordinators. Tyus mentioned that Sharon Whitmore is the Service's Missouri River zebra mussel contact. It was decided that the Committee has a responsibility to keep up-to-date on current zebra mussel findings. Whitmore will compile zebra mussel information and send to all on MRNRC's mailing list.

August 6

Farabee described a recreational use survey he conducted. He believes total recreational use surveys are more practical than just creel surveys because, in addition to creel data, other valuable information is obtained without much more effort. In the 60's, the UMRCC decided they needed standardized sport creels. Various surveys were conducted by Nord in 1976, Wright in 1970, and Fleener in 1975. In the 70's, the Committee decided to conduct total recreational use surveys and secured support from all the states to use the "Fleener" method. The survey he conducted was in 1987 and 1988 on Pool 24 on the Upper Mississippi River and cost between $15,000 and $17,000. It involved three full-time clerks at eleven contact sites that were weighted to determine sample frequency. The survey involved 24-hour coverage through four seasons. Results revealed that recreationists spent the highest percentage of visits loafing, sport fishing, pleasure boating, and sightseeing. Camping, sport fishing, pleasure boating, and loafing consumed the highest percentage of hours. The survey showed that recreationists utilized the area the most in spring/summer, then fall, then winter. Farabee would recommend that a survey such as this be conducted every five years and that fish length-frequency data also be collected at the same time. Zuerlein mentioned that Nebraska is conducting a "Fleener" type recreational survey this year. It was emphasized that delegates should still send their state's recreational survey methods to Farabee for evaluation.

Adams reported on the Kansas River. Over the past 20 years, the Corps has used Kansas River water to support Missouri River navigation leaving low areas high and dry at times. The state met with the Corps to discuss the issue of including the Kansas River in the Missouri River Master Manual Review. The state believes that Kansas River water is of little value to Missouri River navigation and that the Corps needs to provide justification. As of this meeting, the Corps had taken no stance on the issue; therefore, nothing had been resolved. Fortunately, good rain in the state had refilled the reservoirs but the duration of the present water levels is unknown. The state will continue to pursue the matter.

Kent Keenlyne, MRNRC Coordinator, evaluated the Committee after five years in existence (see attached report). He presented seven objectives that the Committee had identified for itself at its inception. He indicated that of the seven objectives, two were being done very well, one was improving, and four needed direction. He prompted the group to look back at the objectives to identify what the Committee should be doing and to become proactive instead of reactive. He also emphasized the importance of subcommittees and continuity in membership. It was decided that it might be time for the Committee to do some planning and that the topic be included under "Other Business" on the agenda. It was mentioned that MICRA's Strategic Plan could be applicable.

Unkenholz reported on efforts to obtain Indian involvement by inviting Missouri River tribal game and fish representatives to the meeting. He asked Schilf for her thoughts on how the Committee should proceed. She stated that, because the tribes have the right to govern their lands and that most have game and fish agencies, the MRNRC should seek their participation. Butch Denny and Mike Crosley, Santee Sioux Tribe of Nebraska, both indicated that they would be willing to attend future meetings to find out what is going on in the basin but would like to be informed of upcoming meetings sooner in the future. A decision was made to draft a letter to Ron Skates, President, Great Plains Region, Native American Fish and Wildlife Society (NAFWS), stating that the committee seeks to involve the tribes and to request a list of tribal game and fish personnel along the river for MRNRC's mailing list. **It was also decided to invite a NAFWS representative to talk on tribal issues at next year's summer meeting.**

Whitmore reported on the Rare and Endangered Fish Subcommittee. A list of 23 Missouri River rare and endangered fish and brief descriptions of each has been completed. The list revealed that work is still needed to ascertain the river-wide status of many of these species. She indicated that the subcommittee has had no clear goals and is in need of a plan of action to proceed. A plan, which will involve the coordinated collection of information to assess the river-wide status of the identified species, is in developmental stages. The plan will also involve the development of a compendium of Missouri River information for each species.

Mark Dryer, Service, reported that.a letter will be sent out next week to all interested parties announcing the start of the 90-day comment period for the Draft Pallid Sturgeon Recovery Plan. The plan's short-term goal is to prevent extinction, and the long-term goal is to have self-sustaining populations in selected river reaches by 2040. It includes four work areas: protection of individuals, an artificial propagation program, applied research, and a recovery implementation program. He reported on work being done in the various states and by various agencies. He mentioned Blind Pony's propagation efforts and Missouri's plans to stock fish. The recovery team approved their stocking plan which will involve approximately 10,000 to 11,000 fish. Before the state will stock, a genetics analysis must show that the fish are pure pallids. In addition, any parties wanting propagated fish for information/education or research purposes will have first priority. He handed out a ruler with sturgeon information on it that is available free to bait shops and others. Immediate plans include obtaining more brood stock for Gavins Point for spawning next year and attempting to assess the true status of the fish possibly by semi-annual sampling at set monitoring sites. **A decision was made for MRNRC to submit coordinated comments on the Draft Recovery Plan.**

Jim Milligan, Service, reported that he has been participating in the development of a Lower Missouri River Emergency Oil Spill Response Plan for river mile 0 to 811 involving the Service, Corps, Coast Guard, EPA, and each state. It was initiated as a result of the 1990 Oil Pollution Act which was passed after the Valdez Oil Spill. He foresees that all waterways will eventually have a plan such as this. They are developing a manual complete with a notification roster and details on what to do in the event of an emergency to minimize environmental impacts. On the Missouri River, pipelines and railroads present more potential for spills than barges. He must designate critical habitat of all land along the navigation channel and would like the MRNRC to coordinate with their identified state contacts to provide input. He would also like to identify tribal contacts along the river. **Milligan will send a list of the identified state contacts to Zuerlein who will distribute to delegates.**

It was agreed that strategic planning would be beneficial for the Committee at this point. **To accomplish this task, members will review various identified documents by March. The following documents will be distributed by** the Coordinator: a list of issues that were identified by Service personnel during development of their Missouri River Initiative proposal, MICRA's strategic plan, a list of important issues identified by MRNRC during an exercise at one of their first meetings, and Missouri's Big River Fisheries Ten-Year Strategic Plan. The Executive Board and subcommittee chairmen will meet for half a day at the spring meeting to develop a plan framework.

Power recapped what Hesse had discussed in Nebraska's report that the Corps might not require as much water as is thought to maintain the navigation channel (refer to pages 8 and 9 of the report). Measures other than water release strategies from the dams could be taken in those few problem areas where certain flows are needed. In addition, flow needs may be less critical for navigation than for authorized project purposes. He emphasized that the Committee should explore this issue further.

Attachments

- Summary of Master Manual Review Input Mailing
- Missouri River Main Stem Current Hydrological Conditions - Sveum
- Corps of Engineers Data - Wooster
- Preliminary 1992-1993 AOP Regulation Studies - MBSA Technical Advisory Committee
- 1993 Annual Operating Plan Recommendations for the Missouri River - Nebraska
- Minutes of the July 9, 1992, Tern and Plover Management Team Meeting - Latka
- Evaluation of Effectiveness of the MRNRC - Keenlyne
- List of Rare and Endangered Fish of the Missouri River - Whitmore

Attendance List (from first day of meeting)

Name	Agency	Phone
Kent Keenlyne	USFWS, Missouri R. Coordinator	605-224-8693
Gordon Farabee	Missouri Dept. Conservation	314-751-4115
Jim Milligan	USFWS, Fishery Resources	314-445-1911
Dave Wooster	COE, Reservoir Control Center	402-221-7350
Chris Hunter	MT Fish, Wildlife, Parks	406-444-3183
Duane Sveum	COE, Reservoir Control Center	402-221-7347
Jeff Hendrickson	ND Game & Fish Dept.	701-654-7475
Greg Power	ND Game & Fish Dept.	701-221-6323
Doug Latka	COE, Missouri River Division	402-221-7281
Sharon Whitmore	USFWS, Pierre, SD	605-224-8693
Steve Adams	KS Dept. Wildlife and Parks	913-296-2281
Thomas W. Gengerke	IA Dept. Natural Resources	712-336-1714
Gene Zuerlein	NE Game & Parks Commission	402-471-5555
Dave Fielder	SD Game, Fish and Parks	605-773-5535
M.S. (Stan) Zschomler	USFWS, Pierre, SD	605-224-8693
Mark Harberg	COE, Missouri River Division	402-221-7270
Butch Denny	Santee Sioux Tribe of NE	402-857-3717
Mike Crosley	Santee Sioux Tribe of NE	402-857-3302
Harold Isburg	Crow Creek Sioux Tribe	605-245-2296
Marcia Wells	Crow Creek Sioux Tribe	605-245-2187
James Riis	SD Game, Fish and Parks	605-773-5535
J. Edward "Jim" Brown	IA Dept. Natural Resources	515-281-8926
James Hall	IA Dept. of Transportation	515-239-1685
Mark Albee	MT Dept. Nat. Resources & Conserv.	406-444-6635

Delvin D. Brosz	SD Dept. of Enviro. & Nat. Resources	605-773-3352
Dale L. Frink	ND State Water Commission	701-663-8367
Sue Lowry	WY State Engineer's Office	307-777-5927
Dick Schirk	WAPA, Billings, MT	406-657-6536
Stan Mason	WAPA, Watertown, SD	605-882-7500
Donald L. Dicks	MO Dept. Natural Resources	314-751-2548
Tom Stiles	Kansas Water Office	913-296-4094
Bob Keasling	COE, Reservoir Control Center	402-221-7352
Brenda Schilf	Missouri Basin Tribes	406-256-8783
Richard Opper	Missouri Basin States Assoc.	406-542-6272
Joel Medlin	USFWS, Bismarck, ND	701-250-4402
Roger Collins	USFWS, Bismarck, ND	701-250-4492
Bob Hanten	SD Game, Fish & Parks	605-773-4508

Draft Meeting Agenda

Group name: Missouri River Natural Resource Committee

Meeting title: Summer Annual Meeting

Date(s):	**Start time(s):**	**End time(s):**
August 4, 1992	1:00 pm	5:00 pm
August 5, 1992	8:00 am	5:00 pm
August 6, 1992	8:00 am	12:00 pm

Place: Ramkota Inn, Pierre, South Dakota

Specific meeting objectives:

1. Develop recommendation to COE regarding 1992-1993 AOP.
2. Updates on Missouri River activities
3. Conduct group business as necessary.
4. Meet Col. Schaufelberger

Manager/chairperson: Unkenholz

Facilitator: Unkenholz/Keenlyne

Recorder: Whitmore

Other participants: State Delegates, MBSA-AOP Subcommittee, Representatives from FWS, COE, BR, WAPA, EPA

Background materials: AOP Information
Previous meeting minutes

Please bring: New business items, final water level recommendations

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Time	Agenda Topic	Person Responsible	Process	Product
Tuesday, August 4				
1:00 pm	Welcome/Agenda Adjustments	Unkenholz	Group discussion	Final agenda
1:15 pm	MRNRC Coordinator Report	Keenlyne	Report	Informed group
1:30 pm	Meet the Colonel	Schaufelberger/ Unkenholz	Report question/ answer	Informed group
2:00 pm	Reservoir Control Center Report	Wooster/ Sveum	RCC Reports	Informed group
3:00 pm	Break			
3:15 pm	Group Discussion Regarding 1993 AOP - State delegates - MBSA - AOP Technical Committee - Federal Agencies	Unkenholz	Facilitated discussion	Informed group Tentative AOP Recommendations
5:00 pm	Adjourn			

Time	Agenda Topic	Person Responsible	Process	Product
5:30 pm	Leave for driving tour to Whitlocks and Dinner at Bob's Steak House			
Wednesday, August 5				
8:00 am	On The Waters Field Trip - Depending on weather conditions and fishing conditions, there are several options to consider.			
12:00 pm	Lunch on your own			
1:00 pm	Tern and Plover Management Team Report	Latka	Report	Informed group
1:30 pm	Master Manual Review Update	Latka/Harberg/ Taylor	Report	Informed group
2:15 pm	Final AOP Discussion if needed	Unkenholz	Group discussion	Final recommendations
3:00 pm	Break			
3:15 pm	Contaminants	Ruelle	Report	Informed group
3:35 pm	Missouri Catfish Closure	Farabee	Report	Informed group
3:45 pm	Downstream Mitigation Update	Farabee	Report	Informed group
4:00 pm	Kansas Reservoir Update	Adams	Report	Informed group
4:15 pm	Zebra Mussel Update	Tyus	Report	Informed group
5:00 pm	Adjourn			
Thursday, August 6				
8:00 am	MICRA Update	Rassmussen	Report	Informed group

Time	Agenda Topic	Person Responsible	Process	Product
8:30 am	Recreational Use Surveys in the Missouri River Basin	Farabee	Report group discussion	Informed group
9:00 am	First 5 Years of the MRNRC	Keenlyne	Report	Informed group
9:30 am	Tribal Fish and Game Involvement on the MRNRC	Unkenholz	Group discussion	Informed group
10:00 am	Break			
10:15 am	Rare and Endangered Fish. Subcommittee Report	Whitmore	Report	Informed group
10:30 am	Pallid Sturgeon Recovery Team Report	Dryer	Report	Informed group
11:00 am	Other Business as Identified			
12:00 am	Adjourn			

Summary of Master Manual Review Input Mailing

The following is a summary of a mailing of additional information for the development of Environmental Quality plans and alternatives that was sent to all MM Review contacts. The packet of material includes a cover letter signed by Joel Medlin (#1), a report describing the Service's metholoogy for obtaining EQ Input (#2), and six documents providing EQ Input (#3-8). The contents of all seven documents are numbered and summarized below.

#1 Letter

This letter of May 20, 1992 describes the attached material as additional information/recommendations for use in the development of EQ plans and alternatives. It emphasizes that the information does not constitute final recommendations of the Service but is to be used only as a planning tool or a starting point.

The letter recaps the history of the Service's involvement in the MM Review progression stating that:

> The COE had asked the Service for the identification and/or development of an operational scenario that falls within current authority and one that falls outside.
>
> The Service was to provide additional support to the COE for development of operational alternatives that balance fish & wildlife needs.
>
> Service must finalize value functions, which will relate flows or pool levels to resource ratings in specific river and reservoir reaches prior to development of EQ input.

The letter further explains that the Service decided to initiate coordination for EQ development before the COE finished with value function formulation and modeling by sending a letter to all contacts in Oct. of 91. That letter explained the Service's approach to the EQ planning process and requested information from the seven states, Service offices, the MRNRC and MBSA's environmental subcommittee. The requested information constitutes the bulk of this mailing (#3-8).

The letter states that to receive support for the value functions and models, the COE will need to assess their validity by weighing the results against the historical (actual) hydrologic record (1898-1990). They must be able to compare MM operational scenario alternatives with baseline conditions and the optimum resource scenario and obtain valid results. The COE should assess this before the environmental subcommittee meeting in July. The letter further recommends that the COE use the assistance of Terry Waddle (NERC) and Mark Butler (RO) to do this. Specific details that should be addressed and presented to the subcommittee include:

1. Historical (Actual) Hydrology (See letter for definitions.)
2. Run-of-River Hydrology
3. Present and Alternative Operation Scenarios

The letter states that all of the above needs to be addressed if the value functions are to be considered valid. After the July interagency meeting to analyze EQ input and develop alternatives, the Service will complete it's EQ plan and select alternatives.

The letter includes a paragraph describing the possibilities of EQ plans/alternatives being accomplished under current MM guidelines via the AOP or by modification of the MM that would require an act of Congress according to the COE.

The letter also reiterates the Service's past request that the scope of alternatives be expanded to include:

Run-of-river alternatives -
A split navigation scenario
Navigation for only specific reaches of the river

The letter was sent to FWE - Denver, Columbia, Helena, Grand Island, Manhattan, Bismarck, Pierre, Billings; Chief-WTR; Missouri River Coordinator; NERC; Missouri River FWMAO; MBSA; MRNRC; MT; ND; SD; NE; IA; KS; and MO.

#2 - "EQ Inputs/Recommendations, USFWS, Bismarck"

This must be the document that was sent out to all MM contacts requesting the EQ information mentioned in the above letter. It includes:

- Background information about the Services involvement in the MM review
- A section describing how the Service will use an **Ecosystem Approach**
- Outlines how the Service plans to obtain EQ input/recommendations
- Identifies for each state:
    - contact people
    - river reaches
    - resource issues
    - potential resource management conflicts
- Gives a time schedule for obtaining and formulating resource management options and recommendations
- Includes an EQ Issues Form to be used by MM contacts with the following categories:

State	Regulation & Post Dam Impacts
Reservoir/River Reach	Management Goal
Prepared by	Recommendation
Issue	Justification
Background	Conflicts

#3 From Bob Green (1 EQ Issues Form)

Reservoir/River Reach: All river reaches
Issue: Sediment Transport
Background: Changing streambed shapes will alter value functions being established during MM review. The value functions that relate changes in flow to changes in habitat are dependent on the assumption that the shape of the streambed does not change. Green states that this assumption is tenuous at best.
Mgt. Goal: long term: maintain integrity of riparian habitat dependent upon flow and sediment dynamics.
short term: gather sufficient data to discern flow/sediment relationships to formulate flow recommendations.
Recommendations: Consider channel stability in relation to value function formulation and study flow/sediment relationships

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#4 MONTANA (18 EQ Issues Forms)

Prepared by: Bill Wiedenheft
Reservoir/River Reach: Ft. Peck Reservoir

Issue: Lake trout
Mgt. Goal: Maintain population at present level or slightly higher
Recommendations:
- Increase lake level to normal
- Minimize water drop during incubation (Nov.- April)
- Don't drop levels below 2225 msl

Issue: Cisco
Mgt. Goal: Maintain population at present level
Recommendations: The minimum lake level to maintain the cold water fishery is not yet known. Until then, a minimum level of 2225 msl is recommended.

Issue: Forage minnows
Mgt. Goal: Maintain adequate forage fish to support game fish
Recommendations: Refers to the attached General Water Level Operating Plan which provides recommendations to be used as a general guideline for long term water level management. The plan lists these four recommendations:

1. Absolute minimum pool level of 2225'
2. Avoid successive years of static water levels. Drawdowns should be implemented every 3-4 year.
3. Utilize shoreline vegetation to its ultimate potential. Should be periodically submerged from April to early July for spawning and rearing cover.
4. Water levels should rise ASAP for spring spawners. If a rise is not possible due to low runoff, then keep levels static - do not drop levels.

Issue: Walleye
Background: Population must be artificially maintained.
Mgt. Goal: Maintain the present catch rate of 0.193 fish/hour and an average weights of 2.25 lbs.

Recommendations: Maintain level at 2225' (preferably 2240') to accommodate egg taking. If the COE cannot maintain the level, then mitigation should be provided. Two potential projects were given:

- construct a small dam at Big Dry Creek to store water to be released during spawning.
- construct artificial spawning reefs to promote natural reproduction, although the effectiveness of this is questionable.

Prepared by: Pat Clancey

Reservoir/River Reach: Missouri River, rainbow side channel at Fort Peck

Issue: Rainbow trout spawning and rearing, minimum flows
Mgt. Goal: Provide adequate year-round flows which are not subject to discharge fluctuations.
Recommendations: To achieve a minimum requirement of 250 cfs, 7800 cfs must be released from the powerhouse which the COE has not always met. To eliminate this dependence on powerhouse releases, provide the required flows using the by-pass tunnels and a pipeline or ditch to carry water directly to the head of the side channel.

Reservoir/River Reach: Missouri River from Fort Peck Dam to state border

Issue: Pallid Sturgeon
Issue: Native Fish
Issue: Paddlefish
Mgt. Goal: Return river to pre-dam conditions from the mouth of the Milk River to Lake Sakakawea
Recommendations:
- Mimic natural hydrograph
- Return water temps. to natural by selective withdrawal
- Return sediment to river by some method
- Recommended flows - See Chris Hunter's River Recreation figures above

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Prepared by: Dennis Mackey

Reservoir/River Reach: Missouri River from Fort Peck to North Dakota

Issue: Piping Plover
Issue: Interior Least Tern
Mgt. Goal: Reach and maintain recovery population goals by providing a stable habitat base for breeding birds.
Recommendations:
- Maintain dam discharges from 7500-8500 cfs and fluctuations less than 500 cfs during nesting (mid May to mid August)
- Establish and early warning system to detect Milk River flows so dam discharges can be altered to avoid flooding of nests.
- Provide for sediment transport and deposition below dam.

Reservoir/River Reach: Fort Peck Reservoir

Issue: Piping Plover
Issue: Interior Least Tern

Mgt. Goal: Increase numbers of breeding plovers to recovery target population levels by providing suitable habitat
Recommendations: - Drop reservoir levels over winter and early spring to expose beaches. - Do not raise level more than 1.5' during nesting from mid-May through June. - When the above two elements can not be meet, remove vegetation from traditionally used beaches
- During years when water level increases cannot be avoided, level should be raised to prevent birds from nesting on beaches that will be flooded. - Study mechanical removal of vegetation to determine effectiveness.

Prepared by: Chris Hunter

Reservoir/River Reach: Missouri River from Fort Peck Dam to state border

Issue: River Recreation
Mgt. Goal: Provide flows that are adequate for recreation activities
Recommendations: Operate in a base load fashion (no peaking):

April 1- May 10	78,00 cfs
May 11 - June 30	11,000 cfs
July 1 - September 30	7,800 cfs
October - February 28	7,000 cfs
March 1 - March 31	6,000 cfs

Reservoir/River Reach: Ft. Peck Reservoir

Issue: Water Quality - remobilization of pesticides and metals (particularly arsenic)
Mgt. Goal: Minimize remobilization of the pollutants
Recommendations: Maintain elevation 2225' as a minimum pool level.
Justification: Includes a letter from MT (signed by Barclay) to Hazen requesting that the MM review include the upper river in modeling efforts.

Prepared by: Bill Gardner

Reservoir/River Reach: Ft. Peck Reservoir and Missouri River upstream

Issue: Paddlefish Population
Mgt. Goal: 1. Maintain migratory passage of spawning fish from reservoir to river 2. Maintain adequate paddlefish feeding and shelter area.
Recommendations: migratory passage - maintain pool elevation (April-July) to provide sufficient clearance for passage over delta area.
feeding and shelter area - maintain pool elevation (year round) to allow for adequate water depths in important bays.
require COE to fund paddlefish ecology study in Ft. Peck Reservoir.

Issue: Pallid Sturgeon
Mgt. Goal: States that so little is known about pallid habitat requirements that it is difficult to comment.
Recommendations: Require COE to fund pallid sturgeon ecology study in Ft. Peck Reservoir.

Prepared by: Denny Christopherson

Reservoir/River Reach: Missouri River from Ft. Peck Dam to MT/ND border

Issue: Canada goose nesting on islands
Mgt. Goal: Provide flow regime conducive to Canada goose nesting during the nesting period from March 1 to May 30.
Recommendations: - Maintain flows of at least 8300 cfs from March 1 to May 30 to segregate islands from shoreline habitats.

- Levels should remain constant during this period with no more than one foot increase in elevation
- Releases should be adjusted to account for Milk R. flows.

Issue: Wintering population of ≈40 bald eagles below Ft. Peck Reservoir
Mgt. Goal: Maintain good food source (turbine killed fish) to support wintering bald eagle population.
Recommendations: - Until the minimum lake level to maintain the cold water fishery is known (through COE modeling efforts), a minimum level of 2225' is recommended to maintain cisco population.

- Maintain releases at sufficient level from Nov. 1 to Feb. 28 so that cisco will pass through turbines. Because the release amount is unknown, the minimum release recommendation is 7900 cfs.

Prepared by: Paul Hanson, MT Riparian Assoc.

Reservoir/River Reach: Missouri River from Ft. Peck to ND

Issue: Riparian Habitat Mgt.
Mgt. Goal: Enhance regeneration of cottonwood trees.
Recommendations: Provides potential methods to mitigate (?) for impacts from Ft. Peck Dam on downstream forests: (1) allow occasional flooding, (2) gradually taper off flows after high releases, and (3) Provide adequate flows throughout growing season.

#5 NORTH DAKOTA (25 EQ Issues Forms)

Prepared by: Roger Collins and Greg Power

Reservoir/River Reach: ND River Reaches

Issue: Wetlands and Riparian Habitats
Mgt. Goal: Manage river as ecosystem
Recommendations: Manage systems to more closely mimic pre-dam hydroperiod. Specific recommendations not available until Wetland/Riparian study complete.

Reservoir/River Reach: Lake Sakakawea

Issue: Natural Hydrocycle
Mgt. Goal: Assure a stable to rising pool level in most years beginning April 15 and periodically manage for a drawdown, if one does not occur naturally.

Recommendations: Operate system to obtain an unbalanced pool approach between upper three reservoirs. "ND Generic Missouri River System Water Level Recommendations" document is attached.

Issue: Lake Recreation Fishing
Mgt. Goal: To provide annually 1.35 million angler-hours of recreational fishing and a sport catch rate of 0.3 fish/hour by 1995.
Recommendations: Maintain lake elevations between 1835-1848'

Issue: Cold water Habitat for Chinook Salmon and Rainbow Smelt
Mgt. Goal: Maintain salmon harvest of 10,000-20,000 fish. Maintain rainbow smelt population to support predators (relative weight of ≥100).
Recommendations: Minimum lake level of 1820' during growing season. Attachment is included about smelt die-off in Lake Sakakawea in 1990.

Issue: Spawning Habitat for Walleye
Mgt. Goal: Regulate pool levels within range of suitable walleye spawning habitat.
Recommendations: Maintain minimum pool level of 1830'. Preferably above 1835' in Spring and never above 1848'. "ND Generic Missouri River System Water Level Recommendations" document is attached.

Reservoir/River Reach: Garrison Dam to Lake Oahe Headwaters

Issue: Cold water Habitat
Mgt. Goal: Maintain this cold water habitat and excellent water quality.
Recommendations: - Lake Sakakawea must remain above 1822' during summer-early fall period. - Minimum multipurpose pool level of Sakakawea should be raised to 1822' to insure cold water releases.
- Construct multilevel withdrawal outlet to provide temperature control flexibility.

Issue: River Recreation Fishery
Mgt. Goal: Maintain annual recreational fishing effort of 250,000 angler hours through 1995 and a sport fish catch rate of 0.4 fish/hour.
Recommendations: Reduce the magnitude of fluctuations in hourly discharges from Garrison Dam. Releases should remain above 12,000 cfs between 6:00 a.m. and 11:30 p.m. between May 1 and August 15. Continuation of cold water discharges during the summer is strongly recommended.

Issue: Hydro-Peaking
Mgt. Goal: Obtain biological information on the resources of the river and their responses to hydro-peaking.
Recommendations: If obtained info. reveals changes are needed, recommendations would follow.

Reservoir/River Reach: Lake Oahe Headwaters to ND/SD Border (RM 1303-1232)

Issue: Natural Hydrocycle
Mgt. Goal: Assure a stable to rising pool level in most years beginning April 15. A periodic drawdown (every 3-4 years) would be also desirable.
Recommendations: Maintain the upper three reservoirs in a unbalanced method.

"ND Generic Missouri River System Water Level Recommendations" document is attached.

Prepared by: Selena Werdon and Roger Collins

Reservoir/River Reach: MT/ND Border to Lake Sakakawea

Issue: Sicklefin and Sturgeon Chubs
Issue: Blue Sucker
Mgt. Goal: Avoid extirpation and federal listing.
Recommendations:
- Promote maintenance of Yellowstone in unaltered state.
- Investigate life history requirements.
- Stimulate natural hydroperiod
- Provide increased water temps. in dam releases.

* Attached - Service's "Missouri River Endemic Fish Draft Plan"

Issue: Pallid Sturgeon
Mgt. Goal: Avoid extirpation and reverse downward trend.
Recommendations:
- Promote maintenance of Yellowstone in unaltered state.
- Stimulate natural hydroperiod
- Provide increased water temps. in dam releases.
- Provide for sediment transport

Prepared by: Selena Werdon, Roger Collins, and Greg Power

Reservoir/River Reach: Lake Sakakawea

Issue: Paddlefish
Mgt. Goal: Document abiotic parameters (average depth, flow, turbidity) that play integral role in paddlefish life history. Maintain self-sustaining pop.
Recommendations:
- Reduce distance required for migration to spawning in sites.
- Increase flows for spawning.
- Increase water temps.

Mgt. Goal: Avoid extirpation and meet state game and fish departments (MT/ND) goals of long term, sustainable harvest of up to 2,000 fish in ND and 4,000-5,000 fish in MT. Beginning in 1992, a system-wide quota (MT/ND) quota of two paddlefish/individual/year will be allowed.
Recommendations:
- Promote maintenance of Yellowstone and Milk Rivers in unaltered state.
- Stimulate natural hydroperiod
- Provide increased water temps. in dam releases.
- Provide for sediment transport

Reservoir/River Reach: Garrison Dam to Lake Oahe Headwaters

Issue: Blue Sucker
Issue: Paddlefish
Issue: Pallid Sturgeon
Issue: Sicklefin and Sturgeon Chubs
Mgt. Goal: Avoid extirpation and listing of non-listed species and reverse

downward trend.

Recommendations:
- Investigate life history requirements.
- Stimulate natural hydroperiod
- Provide increased water temps. of dam releases.

Prepared by: Kevin Johnson, Roger Collins, Greg Power, and Randy Kreil

Reservoir/River Reach: Lake Sakakawea (RM 1570-1390)

Issue: Piping Plover
Mgt. Goal: Increase piping plover population numbers in ND to 100 pairs and maintain this level for 15 years.
Recommendations: - In lieu of balancing the upper reservoirs, an alternative has been proposed that balances two out of the three reservoirs each year and provides management options for the third. In the year when a reservoir is the "unbalanced" reservoir, both fishery and tern and plover mgt. becomes compatible. Maintain the upper three reservoirs in this unbalanced method.

Issue: Interior Least Tern
Mgt. Goal: Increase least tern population numbers in ND to 250 pairs and maintain this level for 10 years.
Recommendations: - See Recommendations above. Maintain upper three reservoirs in an unbalanced method.

Reservoir/River Reach: Garrison Dam to Lake Oahe Headwaters (RM 1390-1303)

Issue: Piping Plover
Issue: Interior Least Tern
Mgt. Goal: See management goals above.
Recommendations: - Flat loading with peaking should be eliminated. Emulate a more natural hydroperiod with a rise in late spring and reduced flows in summer (not to exceed 18,000 cfs). More detailed recommendations will be made upon completion of EBASCO's tern and plover study.

Reservoir/River Reach: Lake Oahe Headwaters to ND/SD Border (RM 1303-1232)

Issue: Interior Least Tern
Issue: Piping Plover
Mgt. Goal: See management goals above
Recommendations: - See Recommendations above. When Lake Oahe is the "unbalanced" reservoir, provide a managed drawdown to expose nesting habitat.

Prepared by: Mike Johnson, Roger Collins, Greg Power, and Barry Sova

Reservoir/River Reach: Garrison Dam to Lake Oahe Headwaters
Issue: Canada Goose
Mgt. Goal: Provide flow regime conducive to Canada goose nesting
Recommendations:
- Investigate goose nesting along river.
- In the interim, establish max. and min. flows of 24,000 cfs and 14,000 cfs respectively between March 15 - May 31.
- Increase growth of grasses on nesting island.

#6 SOUTH DAKOTA (9 EQ Issues Forms)

Reservoir/River Reach: Oahe Reservoir

Issue: Cold Water Fishery (Salmonids and Rainbow Smelt)
Mgt. Goal: According to the Draft Lake Oahe Mgt. Plan: provide 40,000 user days of fishing and a harvest of 12,000 salmon that average 4 lbs. Provide an annual harvest of 1.2 lbs./angler/day and an annual harvest of 48,000 lbs.
Recommendations: - Cannot recommend specific reservoir elevations due to lack of predator/prey information. The draft mgt. plan puts the "normal minimum habitat base" at 1600-1610 ft. which might be conducive to meeting goals if provided on a long term basis.

Issue: Cool Water Fishery
Mgt. Goal: To provide up to 1,000,000 annual hours of walleye fishing pressure and sustain an average catch rate of 0.25 walleye/hour during May through September. Develop a long term annual water level mgt. plan.
Recommendations:
- Provide steady to slowly rising water levels from early April to early June.
- Flood shoreline vegetation every third year.
- Develop a shoreline revegetation plan to deal with erosion and sedimentation.

Issue: Warm Water Fishery
Mgt. Goal: Expand species composition and develop a long term water level management plan. Develop a long term annual water level mgt. plan.
Recommendations:
- Maximize potential to inundate shoreline vegetation.
- Provide steady to slowly rising water levels from early April to early June.

Issue: Endangered Species
Mgt. Goal: - For terns and plovers: reach recovery plan goals of 580 adult terns in SD (including 400 of Missouri River shared with NE) and 350 pairs of plovers (including 250 on Missouri shared with NE), and fledge ratios of .7 and 1.44 for terns and plovers respectively.
- For bald eagles: meet the goals of the Northern States Bald Eagle Recovery Plan.
Recommendations:*
- Increase nesting habitat and enhance existing habitat
- Monitoring and survey populations each year
- Evaluate creation of habitat during dredging operations.

* (From Biol. Opinion, pp. 54-57)

Reservoir/River Reach: Lake Sharpe

Issue: Fisheries (including pallid sturgeon)
Mgt. Goal: - Provide walleye fishery of 300,000 angler hrs., .25 walleye/hr. harvest rate, and 75,000 walleye/ yr.
- For pallid sturgeon - alter seasonal flows and discharge temps., establish multiple water outlets at Oahe Dam.
Recommendations:
- Study sedimentation from Bad River to determine effects on spawning, river profile and nursery habitat.
- Regulate releases from Oahe to delay walleye spawning

until threat of cold water to eggs is gone.
- Determine status and life history of rare fish.

Issue: Endangered Species
Mgt. Goal: - Establish population of 20 adults of both terns and plovers through enforcement efforts (currently no tern and plover habitat exists on this reservoir).
- Reach goals of the Northern States Bald Eagle Recovery Plan by enhancing habitat to encourage nesting.
Recommendations: - For terns and plovers - island construction is the only feasible alternative (follow parameters of Biol. Opinion, pp. 54-57)
- Initiate cottonwood regeneration projects to benefit bald eagles and other species.

Reservoir/River Reach: Lake Francis Case

Issue: Fisheries
Mgt. Goal: - Tremendous water level fluctuations severely limit fishery mgt. options. The state will continue to stock northerns and crappie.
- Increase walleye production by reducing overharvest.
Recommendations:
- Stabilize water levels during spawning.
- Reseed shorelines.
- Establish maximum water level of 1353 msl.
- Flood shoreline vegetation every third year (possibly requiring levels above 1352 msl).
- During early June, provide 1356 msl or above in White River area for paddlefish collection.

Issue: Endangered Species
Mgt. Goal: - Establish population of 20 adults of both terns and plovers through enforcement efforts (currently no tern and plover habitat exists on this reservoir).
- Reach goals of the Northern States Bald Eagle Recovery Plan by enhancing habitat to encourage nesting
Recommendations: - For terns and plovers - island construction is the only feasible alternative (follow parameters of Biol. Opinion, pp. 54-57).
- Initiate cottonwood regeneration projects to benefit bald eagles and other species.

Reservoir/River Reach: Lewis and Clark Lake

Issue: Fisheries
Mgt. Goal: - There are no firm mgt. goals or objectives available at this time.
- Release at least 20,000 cfs from Ft. Randall Dam in spring for spawning.
Recommendations:
- Investigate establishing a flow regime that more closely approximate natural hydroperiod flows.
- Investigate means of sediment and organic matter transport.

Issue: Endangered Species
Mgt. Goal: - Meet fledge ratios for terns and plovers.

- Reach goals of the Northern States Bald Eagle Recovery Plan.

Recommendations:
- For terns and plovers - increase and enhance habitat (follow parameters of Biol. Opinion, pp. 54-57).
- In the Wild & Scenic Stretch - a corridor project such as the Chutes Proj. (Sioux City to Plattsmouth) should be established which would involve land acquisition to restore habitat diversity.

#7 NEBRASKA (1 document)

Prepared by: Hesse and Carlson
Reservoir/River Reach: Fort Randall Dam downstream to Mouth

Issue: Resource Issues in General

Mgt. Goal: To manage the river's aquatic and terrestrial resources for long-term sustainability on a holistic, ecosystem basis. The challenge will be to integrate ecosystem mgt. into the status quo. Attempts to retrofit environmental actions into the present operational scenario, won't work.
Recommendations: A "run-of-the-river" where reservoir outflow equals inflow, in concert with sediment bypass is the best strategy for recovery. Because this is an impossibility, the following recommendations are offered:

- Follow a hydrograph patterned on long-term, pre-control averages (monthly % of annual runoff) - Release a short duration discharge (1 week) of 80,000 cfs at Yankton and 85,000 cfs at Omaha during either March or June.
- Conduct a demonstration project for sediment bypass at Fort Randall Dam and Gavins Point Dam.
- Mitigate (if necessary) for habitat losses to terns and plovers that may occur initially when flows return to a natural hydrograph pattern.
- Implement channel maintenance discharge to recover channel capacity and coordinate for integrated floodplain mgt.
- Plan and construct fish bypasses at dams.
- Incorporate "selective withdrawal capability" at Fort Randall Dam to approximate expected normal temperatures.
- Explore mitigation and user fees as sources of funding.

#8 Prepared by: Mike LeValley (5 EQ Issues Forms)

All 5 EQ Issues Forms include a table of recommended flows and a table of conflicts that would occur between optimum aquatic habitat flow needs and minimum and full service navigation flow needs from July through November. The recommended flows generally increase from upstream to downstream reaches. Other recommendations are generally the same for all reaches.

Reservoir/River Reach: Sioux City, IA to Plattsmouth, NE (RM 734-594)
Reservoir/River Reach: Plattsmouth, NE to Rulo, NE (RM 594-498)
Reservoir/River Reach: Rulo, NE to Kansas City, MO (RM 498-367)
Reservoir/River Reach: Kansas City, MO to Jefferson City, MO (RM 367-130)
Reservoir/River Reach: Jefferson City, MO to St. Louis, MO (RM 130- 0)

Issue: Aquatic Habitat
Mgt. Goal: Manage all downstream reaches on an ecosystem basis.
The documents state that the present scope of the MM review limits mgt. goals to:
- emulation of pre-development hydrograph pattern while recognizing the existing channel morphology.
- addressing sediment transport and degradation issues.

Recommendations: See individual EQ Issues form for specific recommended flows. He points out that the high recommended flows from March through June could increase degradation if sediment was not resupplied.
Justification: Describes methology behind value functions.

US Army Corps of Engineers

Missouri River Division

Missouri River Main Stem Current Hydrologic Conditions

Prepared for

MRNRC 1992 Summer Meeting

Pierre, SD 4-5 August 1992

by the
Reservoir Control Center
12565 West Center Road
Omaha, NE 68144-3869
(402) 221-7347

MISSOURI RIVER BASIN

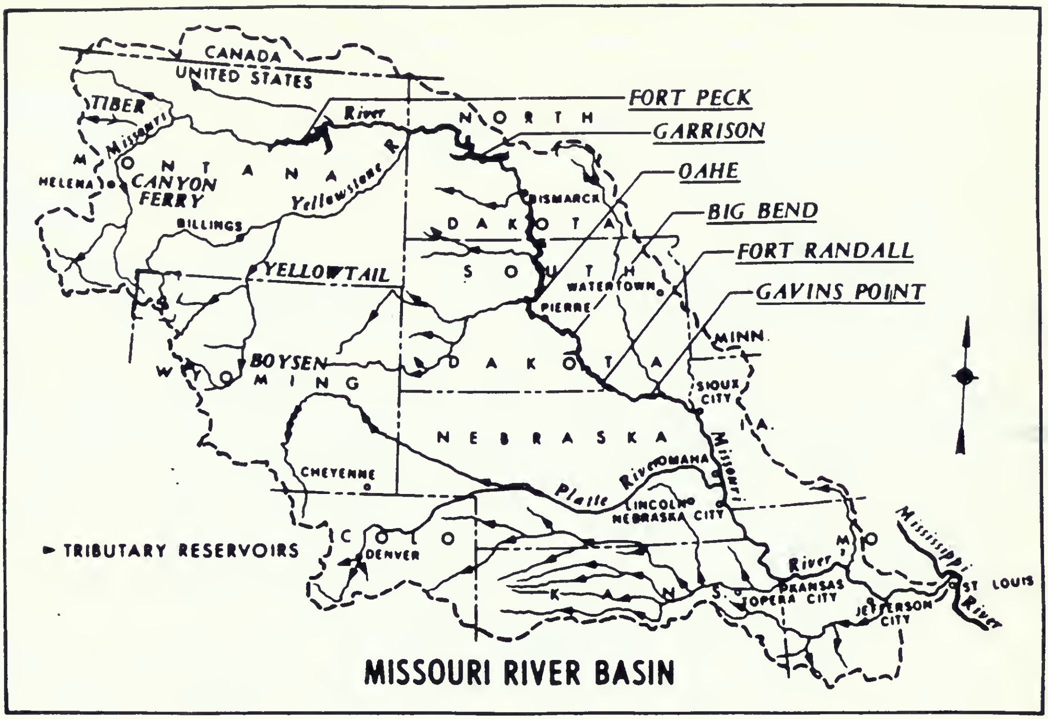
CURRENT HYDROLOGIC AND RESERVOIR AND RIVER CONDITIONS

The above normal precipitation last fall combined with the early onset of winter provided real optimism that the drought cycle of the past five consecutive years was ending. However, the mountain snowpack that accumulated at above normal rates last fall and early winter was interrupted by a change in the jet stream that caused most of the precipitation to fall in the southern half of the basin. Winter precipitation of less than 75 percent of normal in the upper basin compared to 150 percent of normal over much of the lower basin. The July 11, 1992, NOAA/USDA Palmer Drought Severity Map indicates that most of Wyoming, western Montana and North Dakota, extreme northwestern South Dakota, and northern Colorado are now experiencing severe to extreme drought conditions. Moderate drought covers most of eastern Missouri. The remainder of the basin is depicted as normal to moist. The change in the Palmer Index Maps from fall to summer is shown on the enclosed graphics.

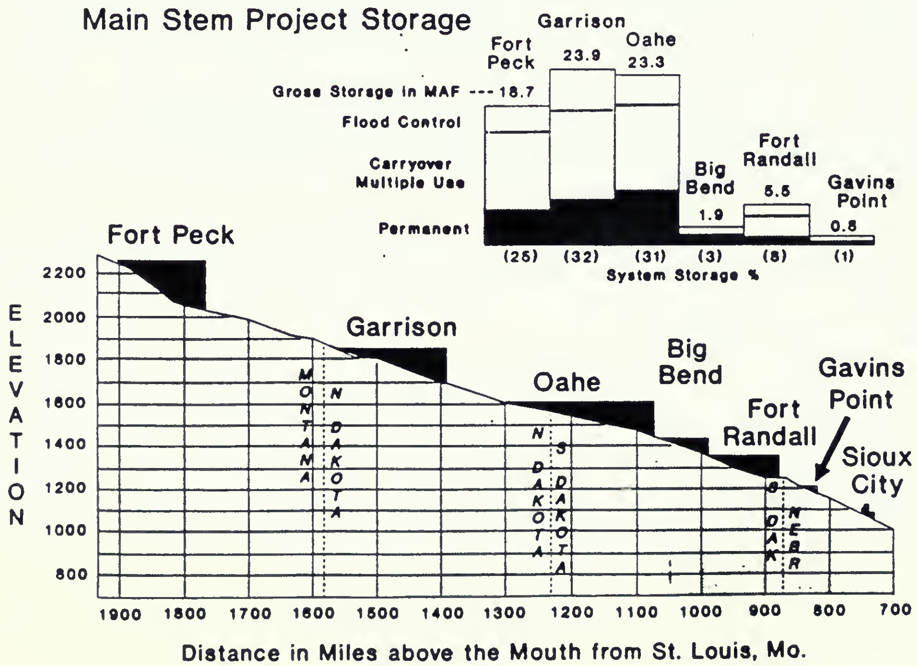
The upper basin is currently experiencing the sixth consecutive year of drought, the ~~preliminary~~ forecasted annual runoff into the Missouri River above Sioux City for 1992 is ~~16.5~~ 17.1 million acre-feet (MAF), or 66 percent of normal. This is an increase over last months forecasted 15.3 MAF as a result of both slightly improved runoff and lower than anticipated system releases due to the extremely wet conditions downstream. The current 6-year drought is the most severe drought since the record 12-year drought of the 1930's and the 8-year drought of the 1950's. As a result of the 6-year runoff deficit, the upper three Missouri River main stem reservoirs have reached record low levels for the period following the initial fill in 1967. The lower three reservoirs are much smaller and their levels have not been impacted by the drought conditions. Reservoir releases have been dramatically reduced and the service to all downstream purposes has been affected except flood control.

On August 1, 1992, the storage contents of all six main stem reservoirs was 45.5 MAF with 70 percent of the Multipurpose-Carryover storage zone remaining filled. This system storage is 2.6 MAF less than 1 year earlier but 4.7 MAF greater than the record low of 40.8 MAF that occurred on January 9, 1991.

According to the water management plan presented in the 1991-1992 Annual Operating Plan, with the actual July 1 system storage (45.0 MAF) being below the 48.5 MAF (lower quartile forecast), the maximum water conservation measure presented in the plan has been implemented. The conservation measures include a 5-week shortening of the 1992 navigation season and continued minimum service flows for the remainder of the season. The press release mailed on July 1, 1992 announcing the early closure of the 1992 navigation season is enclosed.

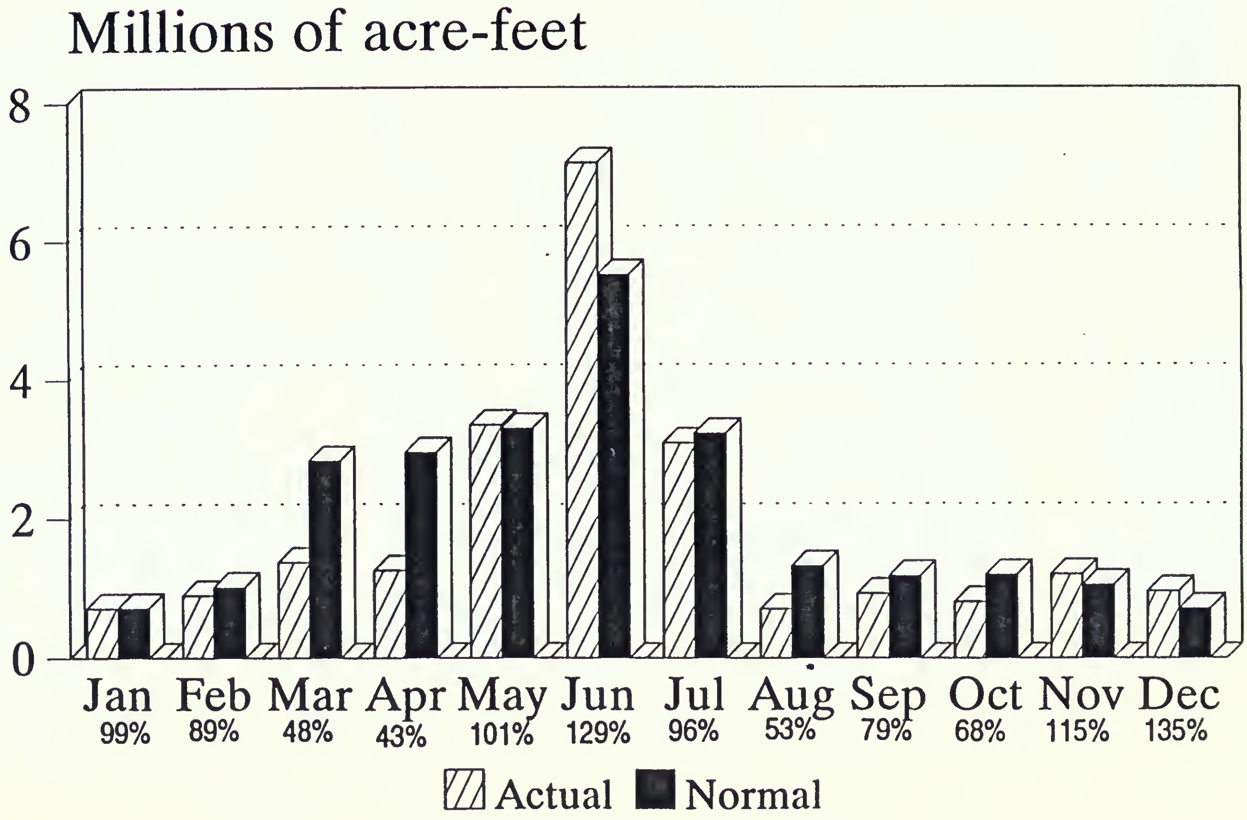


MISSOURI RIVER BASIN

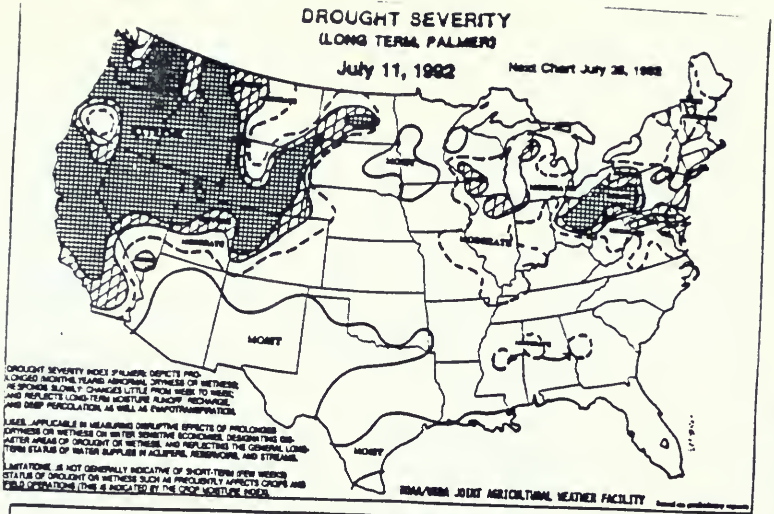


Profile of Missouri River Main Stem Reservoir System

CY 1991 Missouri River Runoff
Above Sioux City, Iowa



Total 1991 estimated runoff is 22.4 MAF



DROUGHT SEVERITY
(LONG TERM, PALMER)

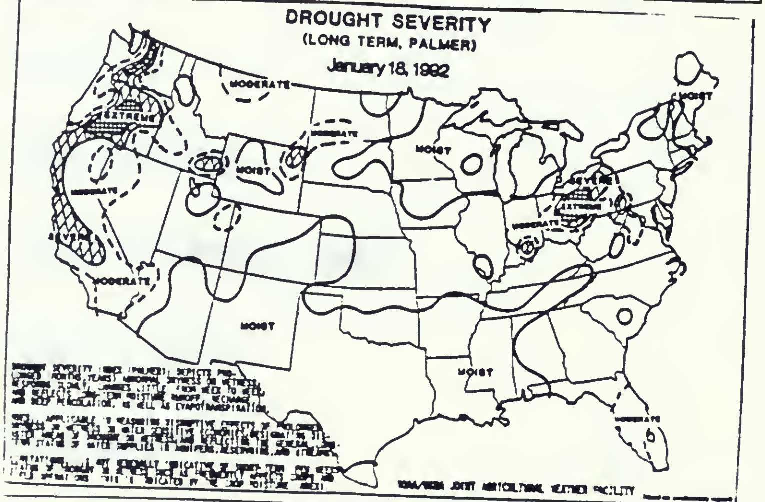
July 11, 1992 Next Chart July 28, 1992

DROUGHT SEVERITY INDEX (PALMER): DEPICTS PROLONGED (MONTHS, YEARS) ABNORMAL DRYNESS OR WETNESS; RESPONDS SLOWLY; CHANGES LITTLE FROM WEEK TO WEEK; AND REFLECTS LONG-TERM MOISTURE RUNOFF, RECHARGE, AND DEEP PERCOLATION, AS WELL AS EVAPOTRANSPIRATION.

USES: APPLICABLE IN MEASURING DISRUPTIVE EFFECTS OF PROLONGED DRYNESS OR WETNESS ON WATER SENSITIVE ECONOMIES, DESIGNATING DISASTER AREAS OF DROUGHT OR WETNESS, AND REFLECTING THE GENERAL LONG-TERM STATUS OF WATER SUPPLIES IN AQUIFERS, RESERVOIRS, AND STREAMS.

LIMITATIONS: IS NOT GENERALLY INDICATIVE OF SHORT-TERM (FEW WEEKS) STATUS OF DROUGHT OR WETNESS SUCH AS FREQUENTLY AFFECTS CROPS AND FIELD OPERATIONS (THIS IS INDICATED BY THE CROP MOISTURE INDEX).

NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY



DROUGHT SEVERITY
(LONG TERM, PALMER)

January 18, 1992

DROUGHT SEVERITY INDEX (PALMER): DEPICTS PROLONGED (MONTHS, YEARS) ABNORMAL DRYNESS OR WETNESS; RESPONDS SLOWLY; CHANGES LITTLE FROM WEEK TO WEEK; AND REFLECTS LONG-TERM MOISTURE RUNOFF, RECHARGE, AND DEEP PERCOLATION, AS WELL AS EVAPOTRANSPIRATION.

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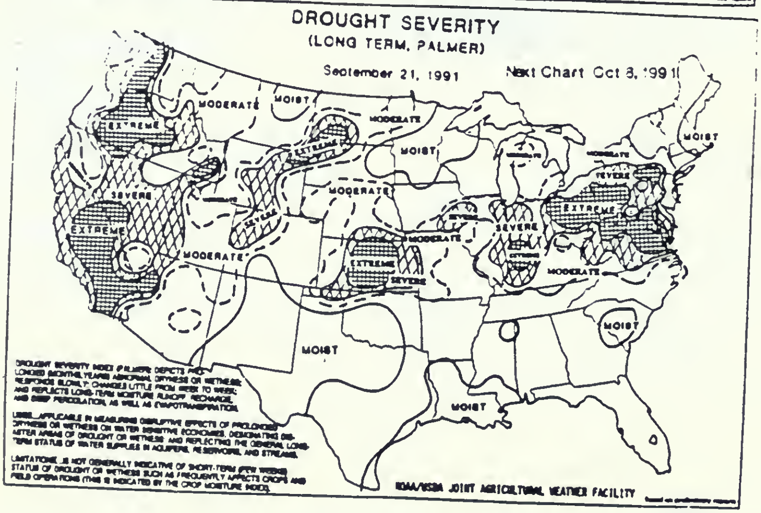
NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY



DROUGHT SEVERITY
(LONG TERM, PALMER)

September 21, 1991 Next Chart Oct 8, 1991

DROUGHT SEVERITY INDEX (PALMER): DEPICTS PROLONGED (MONTHS, YEARS) ABNORMAL DRYNESS OR WETNESS; RESPONDS SLOWLY; CHANGES LITTLE FROM WEEK TO WEEK; AND REFLECTS LONG-TERM MOISTURE RUNOFF, RECHARGE, AND DEEP PERCOLATION, AS WELL AS EVAPOTRANSPIRATION.

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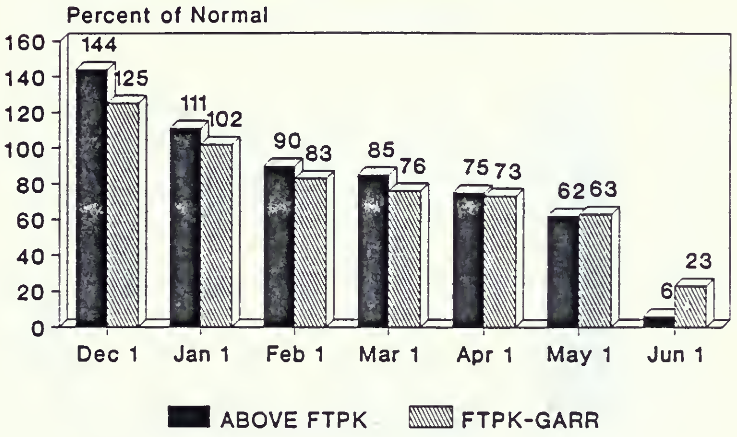
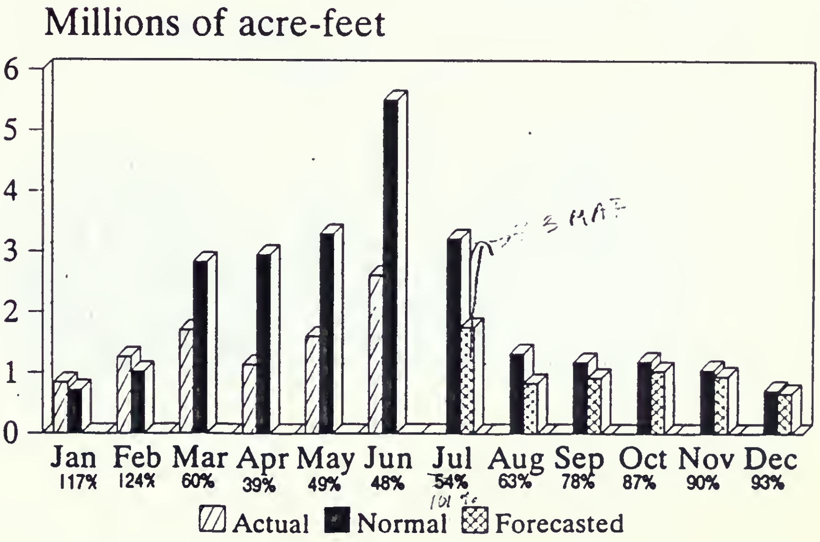
NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY

Mountain Snowpack Water Content
Upper Missouri Basin, Winter 1991-92

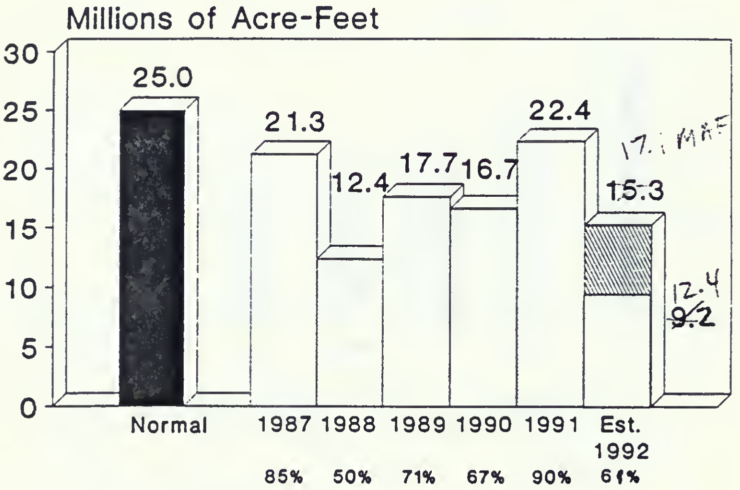


CY 1992 Missouri River Runoff
Above Sioux City, Iowa

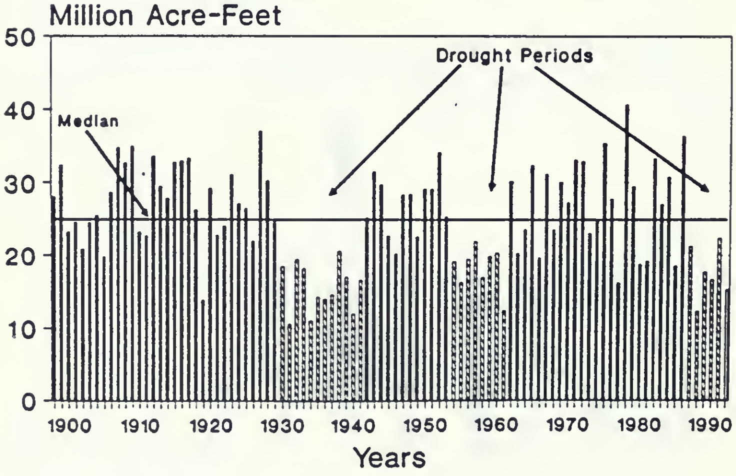


Total 1992 estimated runoff is 15.3 MAF

Missouri River Runoff Above Sioux City
CY 1987-1992 Vs Normal

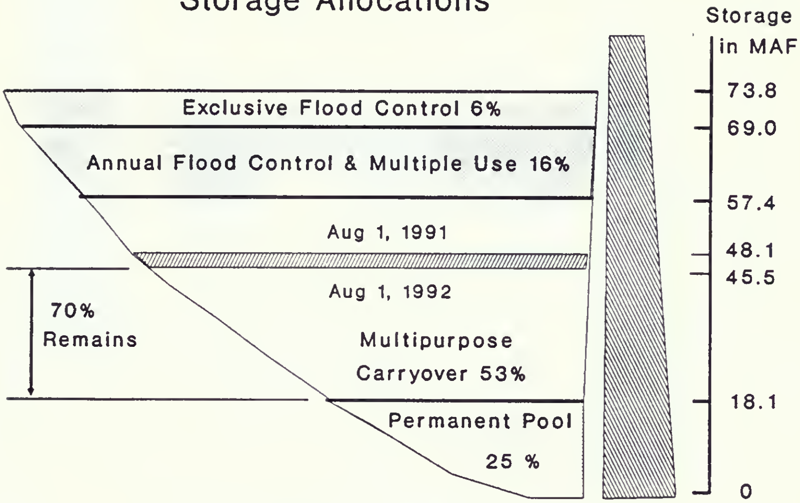


Annual Runoff at Sioux City, Iowa
Adjusted to 1949 Level of Depletions



Missouri River Main Stem System

Storage Allocations

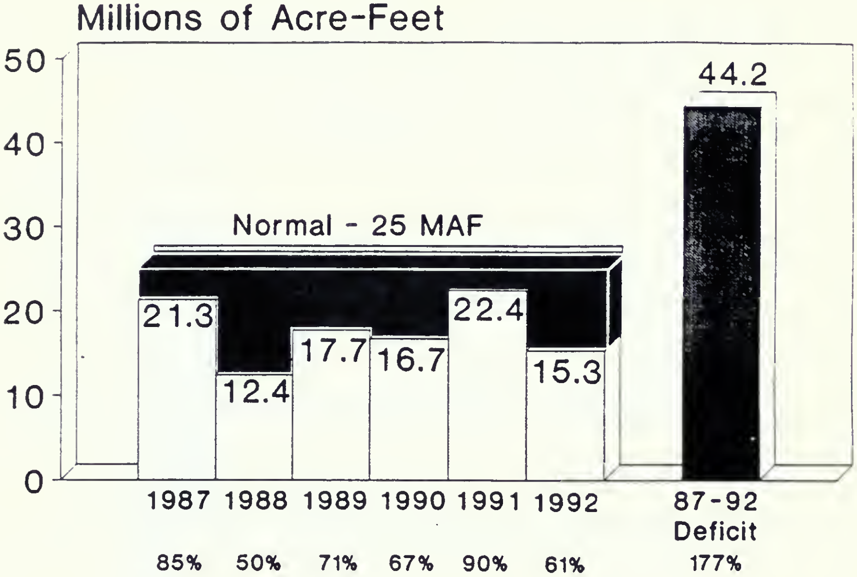

Storage in MAF
Exclusive Flood Control 6%
Annual Flood Control & Multiple Use 16%
Aug 1, 1991
Aug 1, 1992
70% Remains
Multipurpose Carryover 53%
Permanent Pool 25 %
73.8
69.0
57.4
48.1
45.5
18.1
0

Total Storage = 73.8 MAF

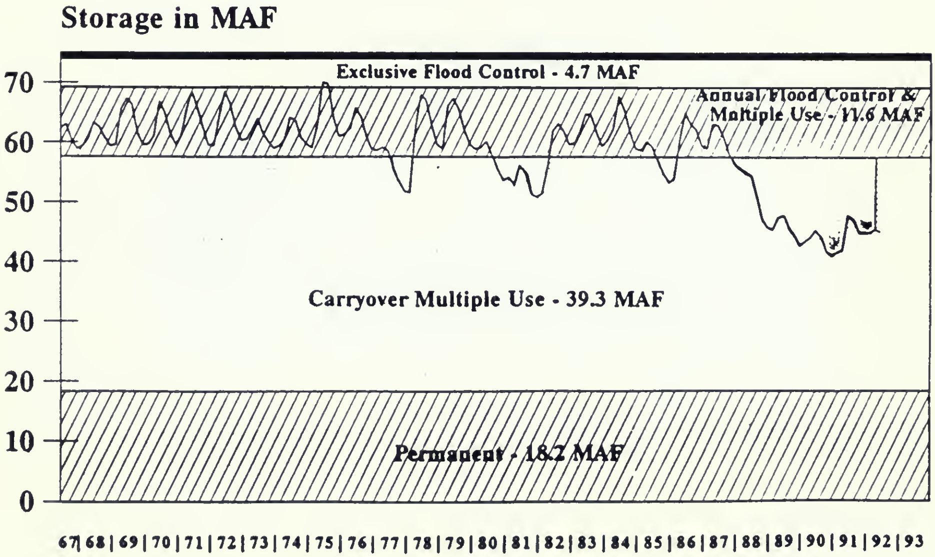
Reservoir Elevations

	Fort Peck	Garrison	Oahe
Exclusive Flood Control	2250	1854	1620
Annual F.C. & Multi-use	2246	1850	1617
Carryover Multiple-use	2234	1837.5	1607.5
Aug 1, 1991	2220.1	1828.7	1591.2
Aug 1, 1992	2212.1	1824.8	1589.9
Permanent Pool	2160	1775	1540

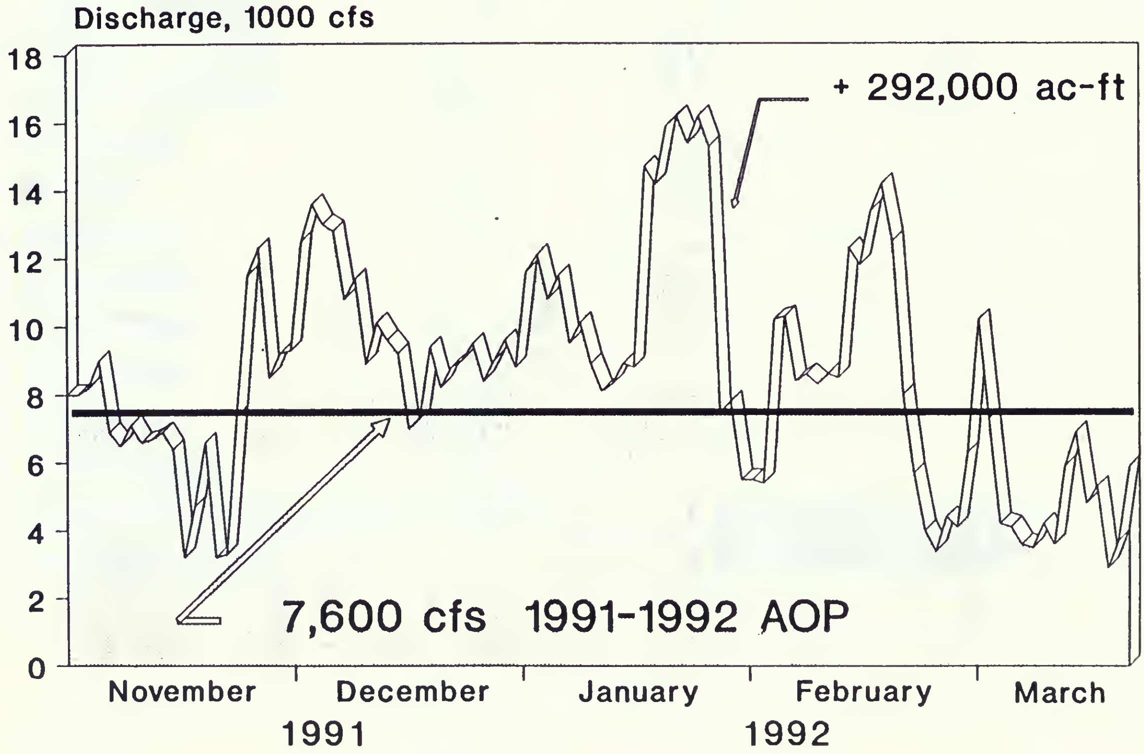
Missouri River Runoff Above Sioux City
CY 1987-1992 Vs Normal



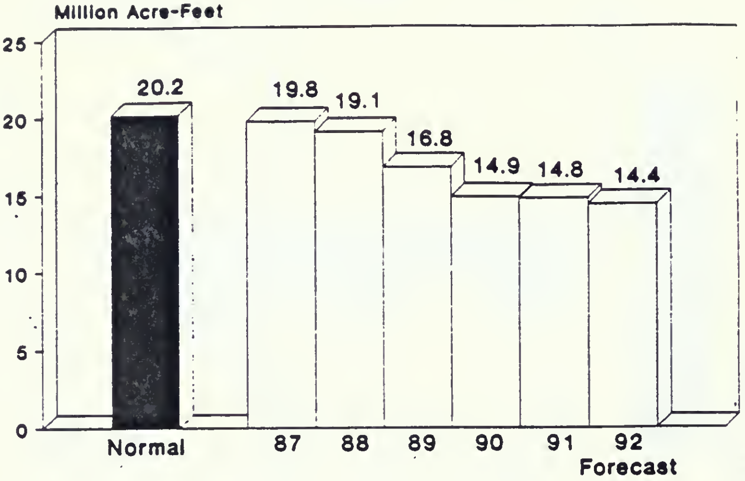
End of Month Storage
Missouri River Main Stem System



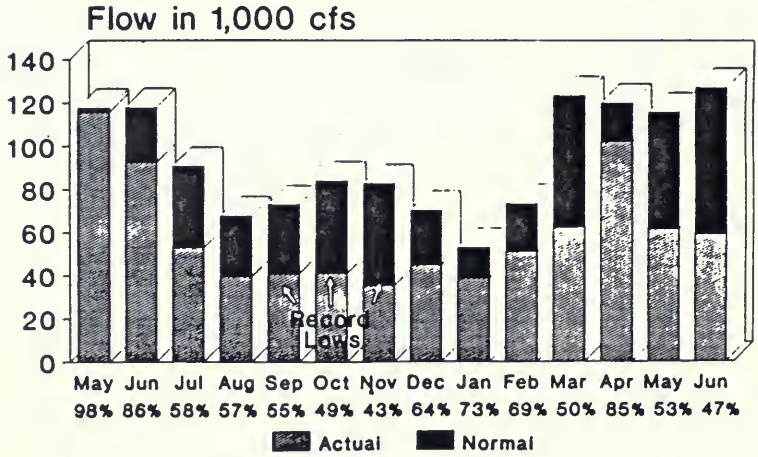
Fort Randall Dam
Winter Release



Gavins Point
Annual Release

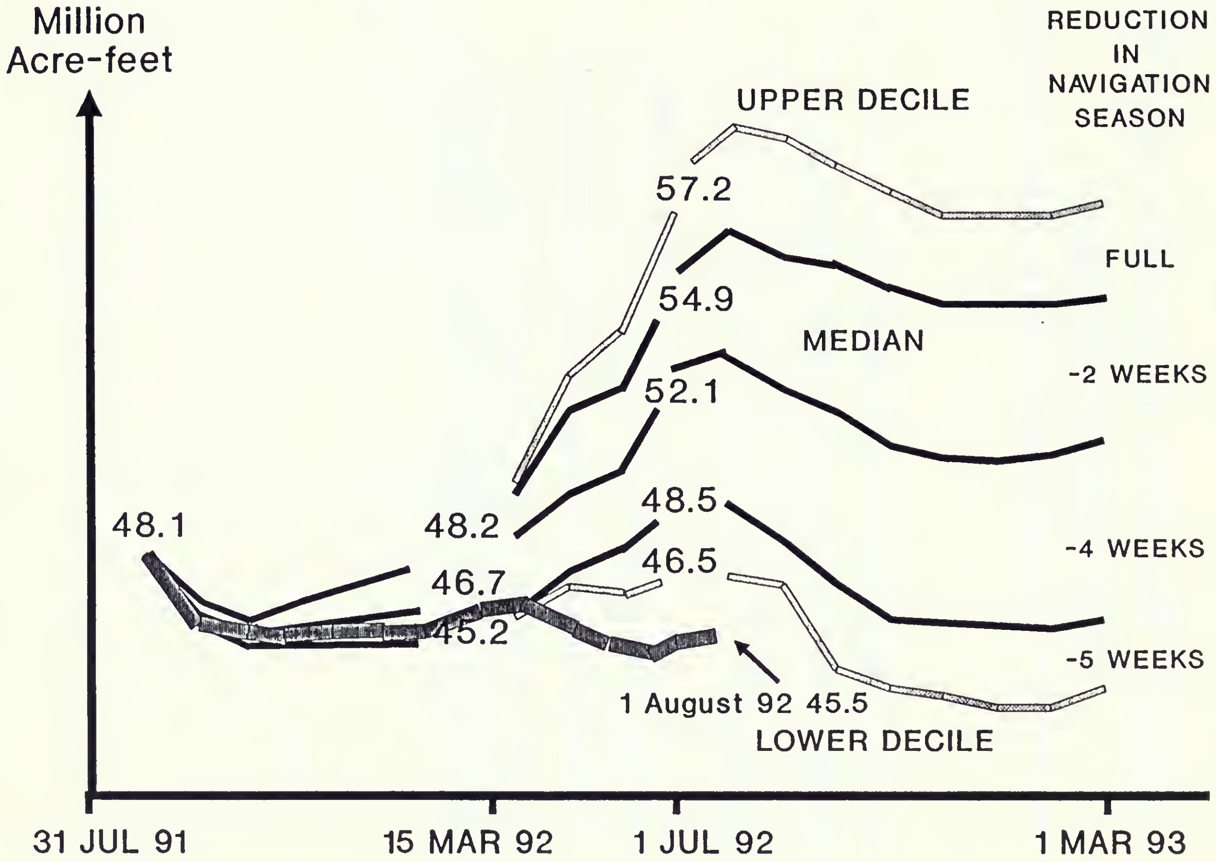


Missouri River at Hermann, MO.
May 1991 - June 1992



Average: 1967-1991

SYSTEM STORAGE 1991-1992 AOP



Water Conservation Measures Navigation Season

- 1987 Full 8 Month Season - Full Service Flows
- 1988 Season Shortened 2 Weeks - Full Service Flows
- 1989 Season Shortened 5 Weeks - Flows 3,000 cfs Below Full Service
- 1990 Season Shortened 5 Weeks - Flows 6,000 cfs Below Full Service (Minimum)
- 1991 Season Shortened 5 Weeks - Minimum Service Flows
- 1992 Same Service As In 1991 If Drought Continues. Both Increased Season Length And Flow Support If Drought Conditions Improve To Normal Or Above Normal Conditions.

US Army Corps of Engineers
Missouri River Division
Public Affairs Office

P.O. Box 103 Downtown Sta.
Omaha, NE 68101

Phone: (402) 221-7208/7435

Contact: Duane Sveum
(402) 221-7347
Paul Johnston
(402) 221-7208

Date: 1 July 1992

News Release

SPECIAL RELEASE

FOR IMMEDIATE RELEASE

Support for commercial navigation on the Missouri River will end five weeks earlier than normal this year because of continued drought. "Like recent years, our plan continues to be one of conservation," said Col. John E. Schaufelberger, Missouri River Division Engineer.

The normal eight-month navigation season will be reduced to 6-3/4 months. Flows to support navigation will end as follows:

	End of 1992 Support
Sioux City, Iowa	October 16
Omaha, Nebraska	October 18
Nebraska City, Nebraska	October 19
Kansas City, Missouri	October 21
Mouth near St. Louis, Missouri	October 25

This schedule conforms with the Missouri River Main Stem Annual Operating Plan that was developed and announced last fall. System storage is now 45.0 million acre-feet (MAF), 2.5 MAF less than last year at this time. This is nearly equal to the storage that existed two years ago.

-more-

Special Release 2.2.2.

Col. Schaufelberger noted that the plan differs only slightly this year from past years. The beginning of flow support during the 1990 and 1991 seasons was delayed for one week and each season closed four weeks earlier than normal. The 1992 season began on the usual starting date but will close one week earlier than each of the past two seasons.

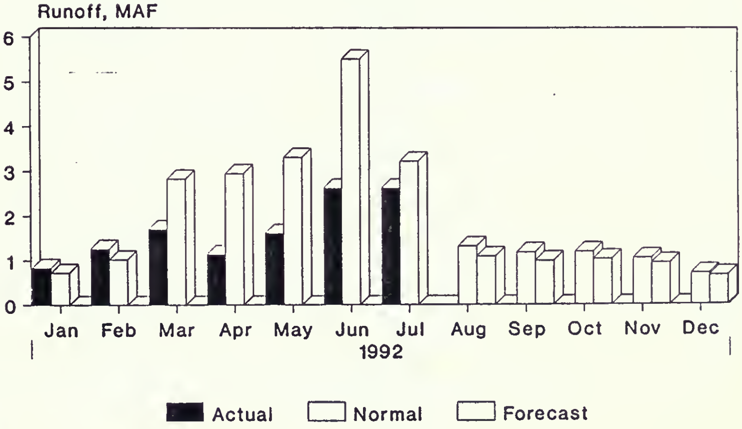
-30-

MISSOURI RIVER NATURAL RESOURCE COMMITTEE MEETING

Ramkota Inn, Pierre, South Dakota
August 4 thru 6, 1992

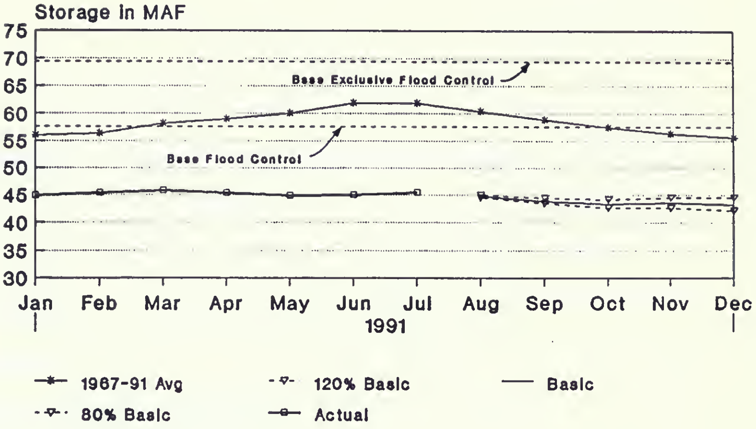
(Corps of Engineer Data)

CY 1992 Missouri River Runoff Above Sioux City, Iowa



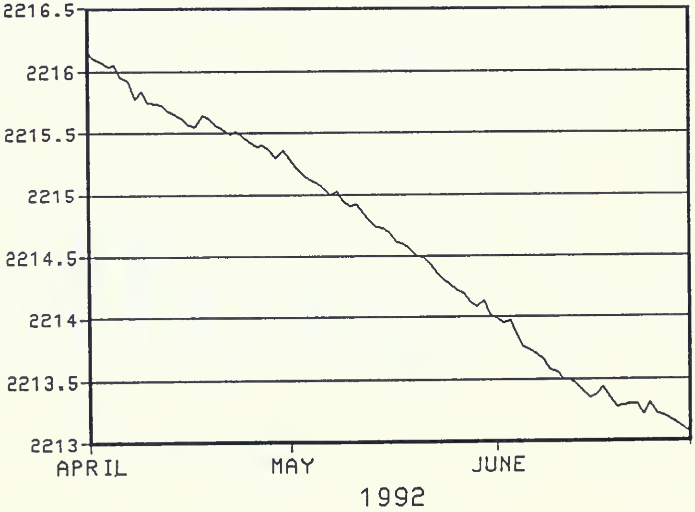
Preliminary Aug Fcst: 16.5 MAF
Normal: 26 MAF

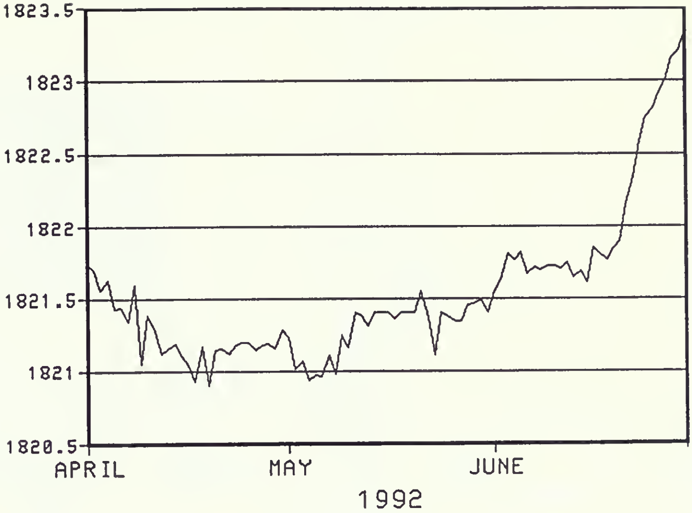
Missouri River Main Stem
End-of-Month System Storage



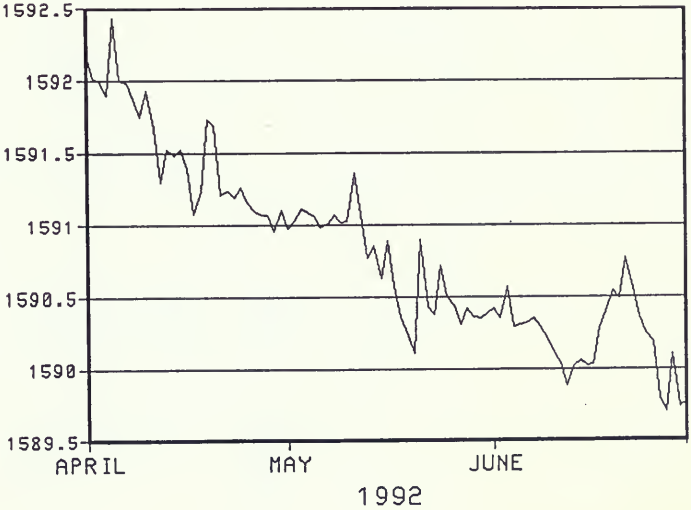
Preliminary Aug 1, 1992 Forecast

FORT PECK POOL ELEVATION



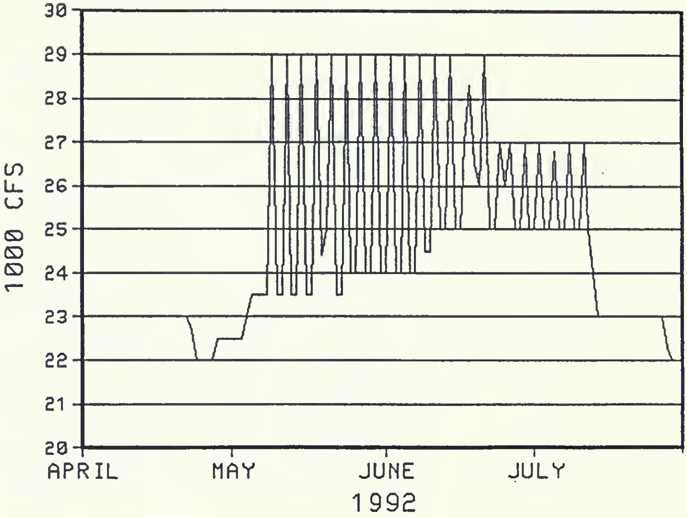


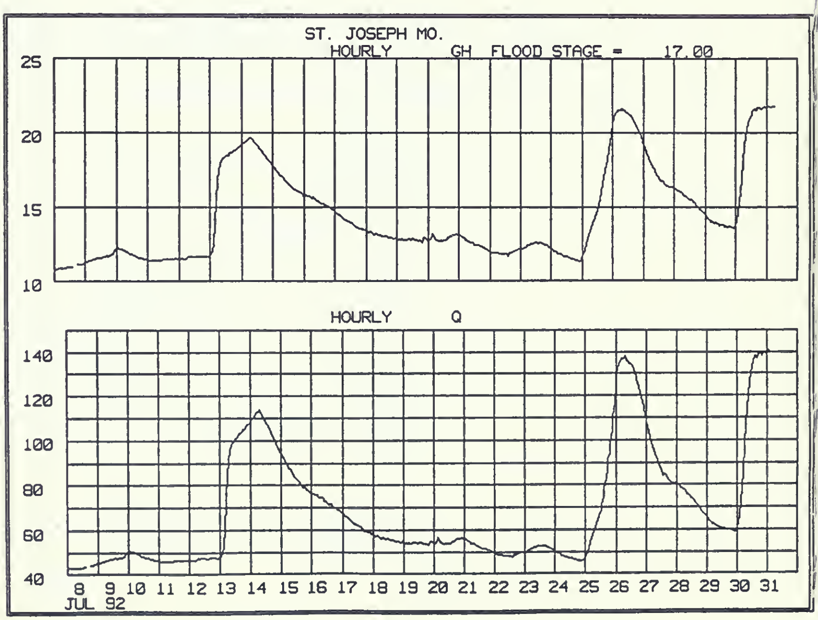
GARRISON POOL ELEVATION



OAHE POOL ELEVATION

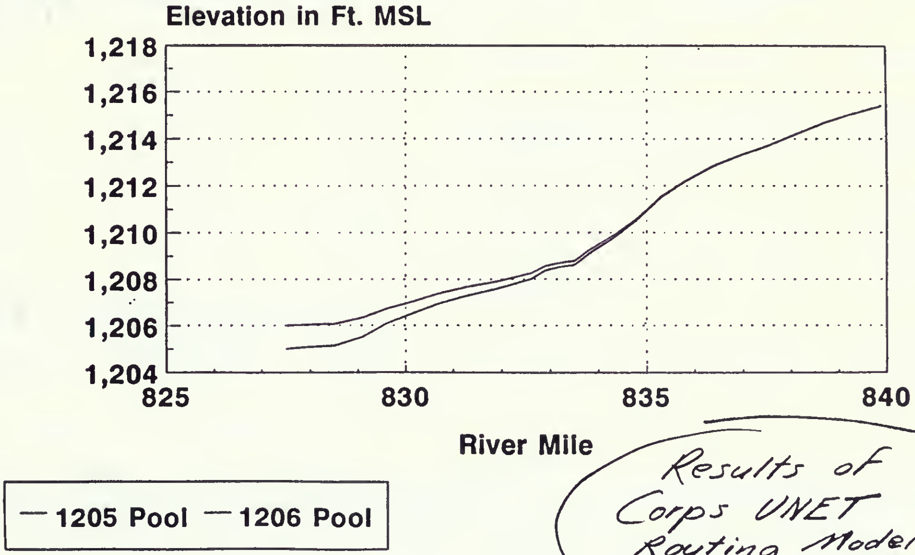
GAVINS POINT RELEASE



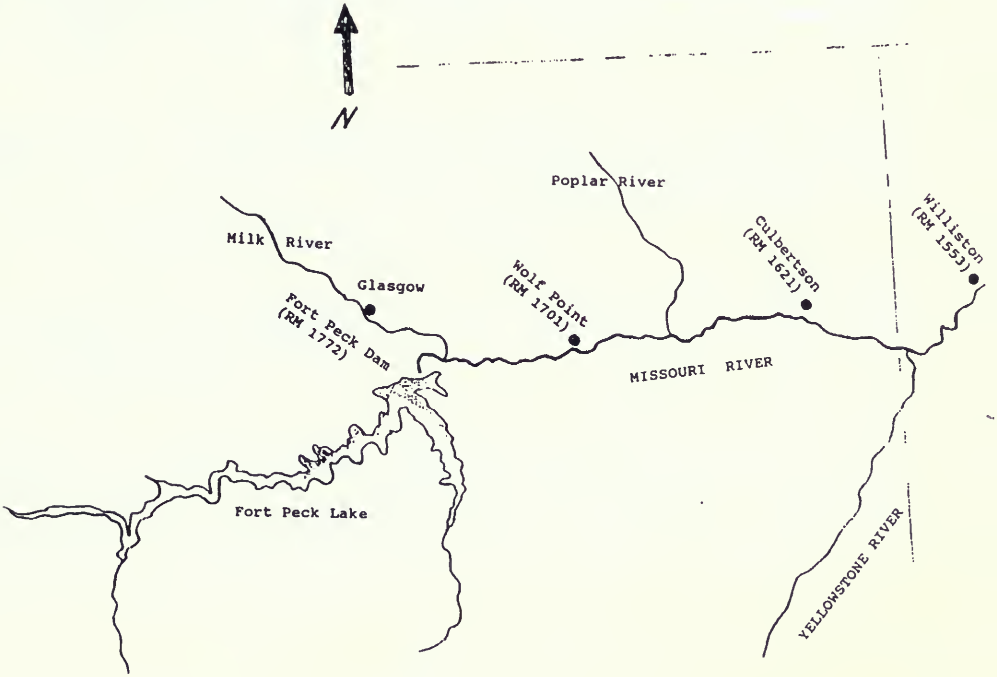


MISSOURI RIVER

Ft. Randall to Gavins Point



Results of Corps UNET Routing Model



29 May 1992

ESTIMATED ELEVATION CHANGES FOR BIRDS BELOW FORT PECK

	Daily Avg Q (cfs)	Max Hrly Peaking	River Mile	Peak Stage	Elevation Increase (ft)
PATTERN 1	8,000 cfs*	8,000 cfs	1,682.3	1943.07	
			1,687.7	1948.55	
PATTERN 2	8,000 cfs*	12,000 cfs	1,682.3	1943.40	0.3
		for 8 hr	1,687.7	1948.77	0.2
PATTERN 4	8,000 cfs*	16,000 cfs	1,682.3	1943.35	0.3
		for 4 hr	1,687.7	1948.73	0.2
PATTERN 3	10,000 cfs**	13,000 cfs	1,682.3	1944.49	1.4
		for 8 hr	1,687.7	1949.68	1.1
PATTERN 5	10,000 cfs**	16,000 cfs	1,682.3	1944.60	1.5
		for 8 hr	1,687.7	1949.77	1.2

* est. 50% to 60% chance of 8,000 cfs or less daily avg. summer 1993.
** est. only 25% chance of release this high or greater summer 1993.

Note: RCC will be making preliminary AOP runs 2nd week of July 92 which will give a better estimate of 1993 Fort Peck summer releases.

Montana Department
of
Fish, Wildlife & Parks

1420 East Sixth Avenue
Helena, Montana 59620
March 31, 1992

Colonel Schaufelberger, Division Engineer
US Army Corps of Engineers
P.O. Box 103, Downtown Station
Omaha, NE 69101-0103

Dear Colonel Schaufelberger:

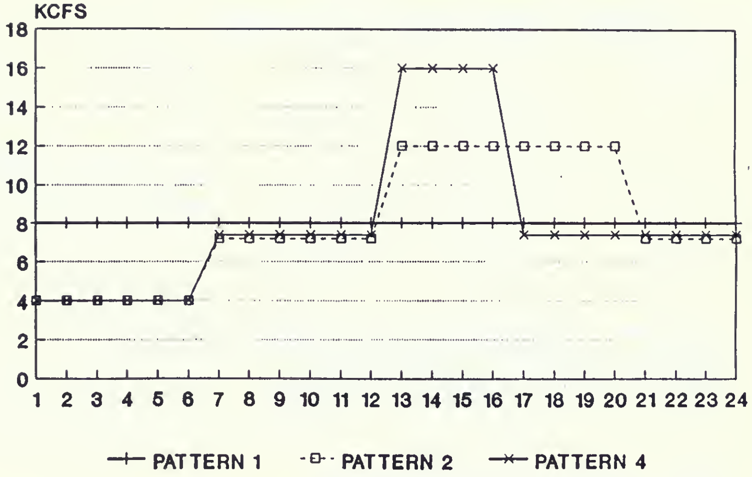
I am writing in regard to operations at Ft. Peck Reservoir. Last year there was conflict between federal protected bird species and spawning rainbow trout downstream of Ft. Peck. Due to nesting terns and plovers downstream of the confluence of the Milk River, USFWS requested the Corps to greatly reduce flow out of the dam when the Milk was flooding. This flow reduction de-watered the side channel and undoubtedly affected spawning success of the rainbow population.

Only 250 cfs are necessary in the side channel to provide the optimum volume of water during the spawning and rearing period (Frazer 1987). To provide this amount, the Corps must release 7800 cfs from the powerhouses. Presently, MDFWP's recommendation for the tailrace fishery is 7800 cfs from April 1 through September 30, and 2700 cfs for the remainder of the year.

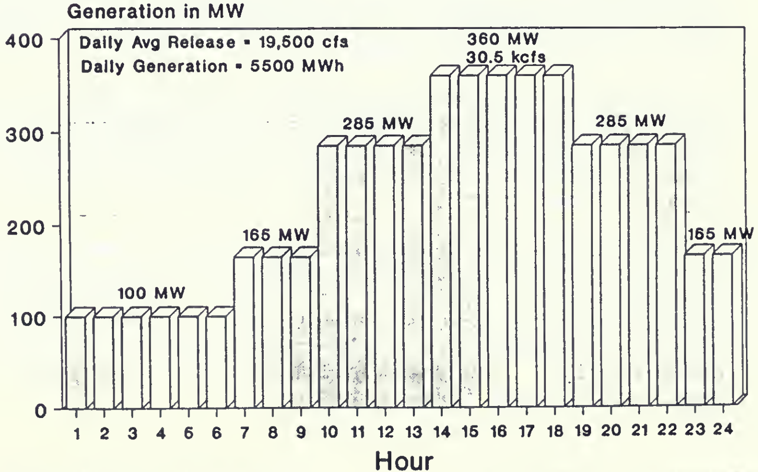
The enclosed map shows the location of the two primary spawning areas in relation to the dam and powerhouses. Redd counts were done throughout the tailrace from 1983 through 1988. During this time, 69 percent of the redds were constructed in these two areas (see enclosed chart).

I would like to request the Corps to evaluate the feasibility of providing 250 cfs to this side channel when discharges from the powerhouse are less than 7800 cfs. One possibility might be to utilize a water source independent of the powerhouse. Perhaps a pipeline running from the by-pass tunnels to the side channel would be feasible. Another option might be a direct feed from the reservoir to the side channel.

FORT PECK HOURLY RELEASE PATTERNS
8,000 CFS DAILY AVERAGES & 8K FLAT



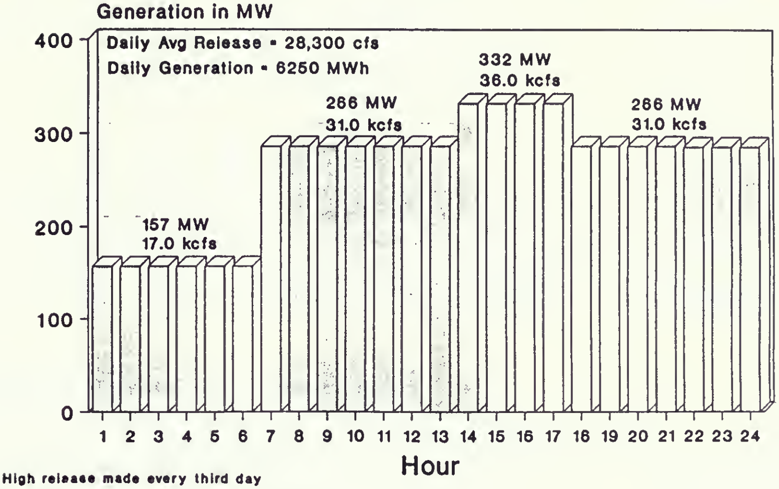
Garrison Daily Generation Pattern 1992
Endangered Species Nesting Season



During 6-hr peak, 1 hr of 390 permitted if followed by equal sag next hr.

During off-peak, 2-hrs of 360 permitted if followed by an equal sag next 2 hrs.

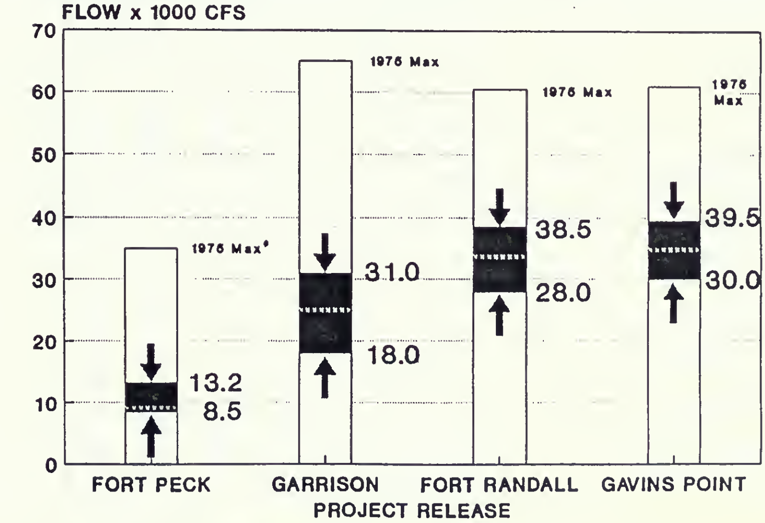
Fort Randall High Day Peak Pattern 1992
Endangered Species Nesting Season



High release made every third day

Do not exceed 288 MW for periods shown

DAILY RELEASE RATE FOR CREATED HABITAT



xxx = Avg August Flows Series 8-83 (1990)

PRELIMINARY AUGUST 1, 1992 BASIC FORECAST
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/30/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.5	2211.8	2212.2	2212.5	2212.9	2211.5	2210.4	2209.7
DISCH KCFS	7.2	6.0	3.0	3.0	3.5	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.8	1823.9	1823.2	1823.1	1822.7	1820.9	1819.3	1818.1
DISCH KCFS	19.2	18.0	13.5	10.0	11.3	19.0	20.0	20.0
OAHE								
ELEV FTMSL	1589.9	1589.4	1588.8	1588.6	1589.4	1589.7	1590.4	1591.6
DISCH KCFS	20.6	19.0	16.1	10.4	7.6	16.3	17.0	15.7
BIG BEND								
ELEV FTMSL	1420.1	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.3	18.3	15.6	10.0	7.3	16.1	17.0	15.7
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.3	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	20.9	22.6	25.9	18.0	7.3	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1206.1	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45483	44763	43934	43425	43567	43287	43225	43497
PEAK POWER MW		2098	2075	2039	2004	2115	2134	2178
ENERGY GWH	3374	637	541	391	275	523	546	462

PRELIMINARY AUGUST 1, 1992 80 PERCENT OF BASIC FORECAST

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.5	2211.4	2211.5	2211.4	2211.5	2209.8	2208.4	2207.4
DISCH KCFS	7.2	6.0	3.0	3.0	3.5	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.8	1823.5	1822.4	1821.8	1821.3	1819.5	1817.6	1816.3
DISCH KCFS	19.2	18.0	13.5	10.0	10.0	18.0	20.0	19.0
OAHE								
ELEV FTMSL	1589.9	1589.1	1588.8	1587.7	1588.0	1587.9	1588.5	1589.6
DISCH KCFS	20.6	19.7	14.3	13.3	8.2	16.7	17.3	14.6
BIG BEND								
ELEV FTMSL	1420.1	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.3	18.9	13.8	12.9	7.8	16.4	17.3	14.6
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1343.1	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	20.9	23.0	26.2	18.3	7.4	11.0	11.8	7.8
GAVINS POINT								
ELEV FTMSL	1206.1	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	10.0
SYSTEM								
STORAGE 1000 AF	45483	44524	43452	42697	42644	42189	41989	42186
PEAK POWER MW		2095	2062	2029	1991	2098	2115	2157
ENERGY GWH	3358	646	520	426	272	517	548	429

PRELIMINARY AUGUST 1, 1992 120 PERCENT OF BASIC FORECAST

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.5	2212.0	2212.2	2213.1	2213.9	2213.1	2212.4	2212.5
DISCH KCFS	7.2	6.0	4.5	3.1	3.7	8.0	9.0	8.0
GARRISON								
ELEV FTMSL	1824.8	1824.0	1823.8	1824.2	1824.1	1822.7	1821.4	1820.5
DISCH KCFS	19.2	19.5	14.0	10.4	12.0	19.0	21.0	20.5
OAHE								
ELEV FTMSL	1589.9	1590.0	1590.0	1590.1	1591.3	1591.8	1592.8	1594.2
DISCH KCFS	20.6	18.4	15.1	10.1	7.0	15.9	16.7	15.1
BIG BEND								
ELEV FTMSL	1420.1	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.3	17.8	14.7	9.8	6.8	15.7	16.7	15.1
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.0	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	20.9	22.3	25.6	17.6	6.9	10.4	11.3	8.6
GAVINS POINT								
ELEV FTMSL	1206.1	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45483	44986	44381	44170	44564	44511	44662	45199
PEAK POWER MW		2102	2083	2051	2019	2134	2157	2203
ENERGY GWH	3396	640	546	390	275	520	564	462

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DATE OF STUDY 07/30/92        PRELIMINARY AUGUST 1, 1992 BASIC FORECAST          99001  9901    4  PAGE
TIME OF STUDY 10:02:15                                                                        STUDY NO
                                              VALUES IN 1000 AF EXCEPT AS INDICATED
                31JUL92              1992                                                     1993
                   INI-SUM   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB

 --FORT PECK--
 NAT INFLOW           2200     270     270     340     175      82      93     300     310     360
 DEPLETION             -57     -49     -65      24       3       1       1       1      -3      30
 EVAPORATION           335      68      85      75      34      16      18      39
 MOD INFLOW           1922     251     250     241     139      65      74     260     313     330
 RELEASE              2377     369     181     187      91      42      79     492     492     444
 STOR CHANGE          -455    -118      68      54      48      23      -6    -232    -179    -114
 STORAGE             10976   10858   10927   10981   11028   11051   11046   10814   10635   10521
 ELEV FTMSL         2212.5  2211.8  2212.2  2212.5  2212.8  2212.9  2212.9  2211.5  2210.4  2209.7   -2.4
 DISCH KCFS            7.2     6.0     3.0     3.0     3.0     3.0     5.0     8.0     8.0     8.0
  POWER
 AVE POWER MW                   75      38      38      39      38      63     100      99      99
 PEAK POW MW                    93      93      93      93      93      93     195     183     182
 ENERGY GWH          358.6    56.1    27.6    28.6    13.9     6.4    12.1    74.1    73.6    66.2

  --GARRISON--
 NAT INFLOW           2665     545     420     460     185      86      99     240     270     360
 DEPLETION            -362     -16     -92     -34     -40     -19     -21     -61     -56     -23
 CHAN STOR              -9      13      31                       0     -21     -32
 EVAPORATION           393      80     101      88      40      18      21      45
 REG INFLOW           5002     862     624     594     276     129     157     716     818     827
 RELEASE              6704    1107     803     614     297     153     222    1168    1230    1111
 STOR CHANGE         -1702    -245    -180     -20     -21     -24     -65    -452    -412    -283
 STORAGE             14516   14271   14092   14071   14050   14026   13961   13509   13097   12814
 ELEV FTMSL         1824.8  1823.9  1823.2  1823.1  1823.1  1823.0  1822.7  1820.9  1819.3  1818.1   -1.3
 DISCH KCFS           19.2    18.0    13.5    10.0    10.0    11.0    14.0    19.0    20.0    20.0
  POWER
 AVE POWER MW                  203     152     112     112     124     157     210     219     217
 PEAK POW MW                   410     408     408     407     407     406     400     394     389
 ENERGY GWH          899.9   151.0   109.4    83.6    40.4    20.8    30.1   156.5   162.7   145.5

   --OAHE--
 NAT INFLOW            335      50     100      55      25      12      13              10      70
 DEPLETION             104      48       3      14      -6      -3      -3      13      16      22
 CHAN STOR              -4       6      21      17              -5     -14     -24      -5
 EVAPORATION           376      76      96      84      38      18      20      44
 REG INFLOW           6556    1038     826     588     290     145     204    1087    1219    1159
 RELEASE              6132    1171     956     638     215     111     126    1002    1043     870
 STOR CHANGE           424    -133    -130     -50      75      33      79      85     176     289
 STORAGE             14200   14067   13937   13887   13962   13995   14073   14159   14335   14624
 ELEV FTMSL         1589.9  1589.4  1588.8  1588.6  1588.9  1589.1  1589.4  1589.7  1590.4  1591.6   +2.9
 DISCH KCFS           20.6    19.0    16.1    10.4     7.2     8.0     7.9    16.3    17.0    15.7
  POWER
 AVE POWER MW                  223     187     121      84      94      93     191     199     185
 PEAK POW MW                   615     612     611     612     613     615     617     620     626
 ENERGY GWH          869.1   165.8   135.0    90.2    30.4    15.8    17.8   141.9   148.1   124.2

  --BIG BEND--
 EVAPORATION            98      20      25      22      10       5       5      12
 REG INFLOW           6034    1152     931     616     205     107     120     990    1043     870
 RELEASE              6009    1128     931     616     205     107     120     989    1043     870
 STORAGE              1701    1725    1725    1725    1725    1725    1725    1726    1726    1726
 ELEV FTMSL         1420.1  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5
 DISCH KCFS           21.3    18.3    15.6    10.0     6.9     7.7     7.6    16.1    17.0    15.7
  POWER
 AVE POWER MW                   87      77      51      35      39      39      80      83      74
 PEAK POW MW                   523     538     538     538     538     538     538     538     524
 ENERGY GWH          355.9    64.4    55.6    37.9    12.7     6.6     7.4    59.8    61.7    49.8

--FORT RANDALL--
 NAT INFLOW            190      45      45      20      10       5       5              20      40
 DEPLETION              34      15       7       1       1       0       1       3       3       3
 EVAPORATION           101      25      28      21       8       4       4      10
 REG INFLOW           6063    1132     940     613     206     107     121     976    1060     907
 RELEASE              6337    1392    1541    1105     206     107     121     658     707     500
 STOR CHANGE          -274    -260    -601    -492       0       0       0     318     353     407
 STORAGE              3710    3450    2849    2357    2357    2357    2357    2676    3029    3436
 ELEV FTMSL         1356.2  1353.2  1345.3  1337.5  1337.5  1337.5  1337.5  1342.7  1347.8  1353.0
 DISCH KCFS           20.9    22.6    25.9    18.0     6.9     7.7     7.6    10.7    11.5     9.0
  POWER
 AVE POWER MW                  190     207     135      50      56      55      80      90      73
 PEAK POW MW                   345     311     276     276     276     276     300     324     344
 ENERGY GWH          603.9   141.1   148.9   100.2    18.2     9.5    10.6    59.3    66.7    49.4

--GAVINS POINT--
 NAT INFLOW            660      85      85     100      50      23      27      90      90     110
 DEPLETION              48      11      21       7       5       2       3              -1
 CHAN STOR              22      -3      -6      15      21      -2       0      -6      -1       5
 EVAPORATION            36       7       9       8       4       2       2       4
 REG INFLOW           6936    1456    1590    1205     268     125     143     738     797     615
 RELEASE              6938    1445    1577    1205     268     125     143     738     797     641
 STOR CHANGE            -2      11      13                                                     -26
 STORAGE               380     391     404     404     404     404     404     404     404     378
 ELEV FTMSL         1206.1  1206.5  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1206.0
 DISCH KCFS           23.9    23.5    26.5    19.6     9.0     9.0     9.0    12.0    13.0    11.5
  POWER
 AVE POWER MW                   79      89      67      31      31      31      42      45      40
 PEAK POW MW                   112     113     113      76      76      76      76      76     111
 ENERGY GWH          286.3    58.7    64.3    50.0    11.3     5.3     6.0    30.9    33.3    26.6

--GAVINS POINT - SIOUX CITY--
 NAT INFLOW            405      95      70      55      28      13      15      30      20      80
 DEPLETION              95      29      19       7       5       2       2      10      10      11
REGULATED FLOW AT SIOUX CITY
    KAF               7248    1511    1628    1253     291     136     155     758     807     710
    KCFS                      24.6    27.4    20.4     9.8     9.8     9.8    12.3    13.1    12.8

   --TOTAL--
 NAT INFLOW           6455    1090     990    1030     473     221     252     660     720    1020
 DEPLETION            -138      38    -107      19     -33     -15     -18     -34     -31      43
 CHAN STOR               9      15      46      30      21      -6     -35     -61      -6       5
 EVAPORATION          1340     276     345     297     134      62      71     155
 STORAGE             45483   44763   43934   43425   43527   43559   43567   43287   43225   43497
 SYSTEM POWER
 AVE POWER MW                  856     751     525     352     382     438     702     734     687
 PEAK POW MW                  2098    2075    2039    2003    2003    2004    2115    2134    2178
 ENERGY GWH         3373.5   637.1   540.8   390.5   126.7    64.2    84.1   522.5   546.1   461.7
 DAILY GWH                    20.6    18.0    12.6     8.4     9.2    10.5    16.9    17.6    16.5

                   INI-SUM   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB
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DATE OF STUDY 07/30/92          PRELIMINARY AUGUST 1, 1992 80 PERCENT OF BASIC FORECAST          99001  9901  9901  PAGE
TIME OF STUDY 14:22:17                                                                                        STUDY NO
                                              VALUES IN 1000 AF EXCEPT AS INDICATED
          31JUL92               1992                                                                            1993
                  INI-SUM   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB

 --FORT PECK--
 NAT INFLOW          1760     216     216     272     140      65      75     240     248     288
 DEPLETION           -191     -62     -83       2     -12      -6      -6     -13     -19       8
 EVAPORATION          416      84     106      93      42      20      22      48
 MOD INFLOW          1535     194     193     177     110      51      59     205     267     280
 RELEASE             2374     369     180     186      90      42      79     492     492     444
 STOR CHANGE         -839    -175      13      -9      20      10     -21    -287    -225    -164
 STORAGE            10976   10801   10813   10805   10825   10834   10813   10526   10301   10137   -2.4
 ELEV FTMSL        2212.5  2211.4  2211.5  2211.4  2211.6  2211.6  2211.5  2209.8  2208.4  2207.4
 DISCH KCFS           7.2     6.0     3.0     3.0     3.0     3.0     5.0     8.0     8.0     8.0
  POWER
 AVE POWER MW                  75      38      38      38      38      63      99      98      97
 PEAK POW MW                   93      93      93      93      93      93     182     180     179
 ENERGY GWH         355.6    56.1    27.4    28.3    13.7     6.3    12.0    73.5    72.9    65.5

  --GARRISON--
 NAT INFLOW          2132     436     336     368     148      69      79     192     216     288
 DEPLETION           -364     -34    -100     -33     -40     -18     -21     -50     -47     -21
 CHAN STOR             -9      13      31                       0     -21     -32
 EVAPORATION          491     101     126     109      49      23      26      56
 REG INFLOW          4370     750     521     478     228     106     132     646     755     753
 RELEASE             6511    1107     803     614     297     139     159    1107    1230    1055
 STOR CHANGE        -2141    -356    -282    -137     -69     -32     -27    -461    -475    -302
 STORAGE            14516   14160   13878   13741   13672   13640   13613   13152   12677   12375
 ELEV FTMSL        1824.8  1823.5  1822.4  1821.8  1821.6  1821.4  1821.3  1819.5  1817.6  1816.3   -1.3
 DISCH KCFS          19.2    18.0    13.5    10.0    10.0    10.0    10.0    18.0    20.0    19.0
  POWER
 AVE POWER MW                 203     151     112     111     111     111     198     216     203
 PEAK POW MW                  409     405     403     402     401     401     394     387     383
 ENERGY GWH         867.3   150.8   108.9    83.0    40.1    18.7    21.3   147.0   160.9   136.6

   --OAHE--
 NAT INFLOW           268      40      80      44      20       9      11               8      56
 DEPLETION            104      48       3      14      -6      -3      -3      13      16      22
 CHAN STOR              0       6      22      17               0       0     -39     -10       5
 EVAPORATION          470      96     120     105      47      22      25      55
 REG INFLOW          6205    1009     781     556     276     129     147    1000    1212    1094
 RELEASE             6270    1211     851     819     232     121     135    1025    1066     811
 STOR CHANGE          -65    -202     -69    -263      44       8      12     -24     147     283
 STORAGE            14200   13998   13928   13666   13709   13717   13730   13706   13852   14135   +2.9
 ELEV FTMSL        1589.9  1589.1  1588.8  1587.7  1587.9  1587.9  1588.0  1587.9  1588.5  1589.6
 DISCH KCFS          20.6    19.7    14.3    13.3     7.8     8.7     8.5    16.7    17.3    14.6
  POWER
 AVE POWER MW                 230     167     155      91     101      99     193     201     171
 PEAK POW MW                  613     612     606     607     607     608     607     610     616
 ENERGY GWH         883.2   171.2   120.1   115.2    32.6    17.0    19.0   143.7   149.7   114.6

  --BIG BEND--
 EVAPORATION          123      25      31      28      12       6       7      14
 REG INFLOW          6147    1186     819     791     220     115     128    1010    1066     811
 RELEASE             6122    1162     819     791     220     114     128    1011    1066     811
 STORAGE             1701    1725    1725    1725    1725    1726    1726    1726    1726    1726
 ELEV FTMSL        1420.1  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5
 DISCH KCFS          21.3    18.9    13.8    12.9     7.4     8.2     8.1    16.4    17.3    14.6
  POWER
 AVE POWER MW                  89      69      65      38      42      41      82      85      69
 PEAK POW MW                  523     538     538     538     538     538     538     538     524
 ENERGY GWH         363.5    66.4    49.5    48.6    13.6     7.0     7.9    61.1    63.0    46.5

--FORT RANDALL--
 NAT INFLOW           152      36      36      16       8       4       4              16      32
 DEPLETION             34      15       7       1       1       0       1       3       3       3
 EVAPORATION          125      31      35      25      11       5       6      13
 REG INFLOW          6115    1152     814     781     217     112     127     995    1079     840
 RELEASE             6390    1412    1560    1127     217     112     126     676     726     433
 STOR CHANGE        -274.    -260    -747    -346       0       0       0     318     353     407
 STORAGE             3710    3450    2703    2357    2358    2357    2358    2676    3029    3436
 ELEV FTMSL        1356.2  1353.2  1343.1  1337.5  1337.5  1337.5  1337.5  1342.7  1347.8  1353.0
 DISCH KCFS          20.9    23.0    26.2    18.3     7.3     8.1     8.0    11.0    11.8     7.8
  POWER
 AVE POWER MW                 192     207     136      53      59      58      82      92      64
 PEAK POW MW                  345     301     276     276     276     276     300     324     344
 ENERGY GWH         605.9   143.0   149.3   101.2    19.1     9.9    11.2    61.0    68.4    42.8

--GAVINS POINT--
 NAT INFLOW           528      68      68      80      40      19      21      72      72      88
 DEPLETION             48      11      21       7       5       2       3              -1
 CHAN STOR             24      -4      -6      15      21      -2       0      -6      -1       7
 EVAPORATION           44       9      11      10       5       2       2       5
 REG INFLOW          6850    1456    1590    1205     268     125     143     737     797     529
 RELEASE             6852    1445    1577    1205     268     125     143     737     797     555
 STOR CHANGE           -2      11      13                                                     -26
 STORAGE              380     391     404     404     404     404     404     404     404     378
 ELEV FTMSL        1206.1  1206.5  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1206.0
 DISCH KCFS          23.9    23.5    26.5    19.6     9.0     9.0     9.0    12.0    13.0    10.0
  POWER
 AVE POWER MW                  79      89      67      31      31      31      42      45      34
 PEAK POW MW                  112     113     113      76      76      76      76      76     111
 ENERGY GWH         282.8    58.7    64.3    50.0    11.3     5.3     6.0    30.9    33.3    23.1

--GAVINS POINT - SIOUX CITY--
 NAT INFLOW           324      76      56      44      22      10      12      24      16      64
 DEPLETION             95      29      19       7       5       2       2      10      10      11
REGULATED FLOW AT SIOUX CITY
    KAF              7081    1492    1614    1242     285     133     152     751     803     608
    KCFS                     24.3    27.1    20.2     9.6     9.6     9.6    12.2    13.1    10.9

   --TOTAL--
 NAT INFLOW          5164     872     792     824     378     176     202     528     576     816
 DEPLETION           -274       7    -133      -2     -47     -22     -25     -37     -38      23
 CHAN STOR             16      14      47      31      21      -1     -21     -76     -11      12
 EVAPORATION         1670     346     430     370     166      77      89     192
 STORAGE            45483   44524   43452   42697   42692   42679   42644   42189   41989   42186
 SYSTEM POWER
 AVE POWER MW                 868     722     573     362     382     403     695     737     638
 PEAK POW MW                 2095    2062    2029    1992    1992    1991    2098    2115    2157
 ENERGY GWH        3358.3   646.1   519.5   426.3   130.3    64.2    77.5   517.1   548.2   429.1
 DAILY GWH                   20.8    17.3    13.8     8.7     9.2     9.7    16.7    17.7    15.3

                  INI-SUM   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB
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DATE OF STUDY 07/30/92        PRELIMINARY AUGUST 1, 1992 120 PERCENT OF BASIC FORECAST        99001  9901     3  PAGE
TIME OF STUDY 09:53:18                                                                                     STUDY NO
                                            VALUES IN 1000 AF EXCEPT AS INDICATED
         31JUL92          1992                                                                        1993
                 INI-SUM   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB

 --FORT PECK--
NAT INFLOW          2640     324     324     408     210      98     112     360     372     432
DEPLETION           -150     -22     -43      11      10       5       5     -29     -65     -22
EVAPORATION          253      51      64      56      26      12      14      30
MOD INFLOW          2537     295     303     341     174      81      93     359     437     454
RELEASE             2535     369     268     189      91      49      79     492     553     444
STOR CHANGE            3     -74      35     152      83      33      14    -133    -116      10
STORAGE            10976   10902   10937   11089   11172   11205   11218   11085   10969   10979
ELEV FTMSL        2212.5  2212.0  2212.2  2213.1  2213.6  2213.8  2213.9  2213.1  2212.4  2212.5    -2.5
DISCH KCFS           7.2     6.0     4.5     3.1     3.1     3.5     5.0     8.0     9.0     8.0
 POWER
AVE POWER MW                  75      57      39      39      44      63     100     112     100
PEAK POW MW                   93      93      93      94      94      94     187     186     186
ENERGY GWH         384.5    56.2    40.8    28.9    14.0     7.5    12.2    74.5    83.5    67.0

  --GARRISON--
NAT INFLOW          3198     654     504     552     222     104     118     288     324     432
DEPLETION           -442      -6     -80     -36     -54     -25     -29     -90     -88     -35
CHAN STOR             -8      13      16      15              -4     -16     -32     -11      11
EVAPORATION          298      61      76      67      30      14      16      35
REG INFLOW          5868     981     791     725     337     159     194     804     955     922
RELEASE             6981    1199     833     638     309     167     238    1168    1291    1139
STOR CHANGE        -1113    -218     -42      88      28      -8     -44    -365    -336    -217
STORAGE            14516   14298   14256   14344   14372   14364   14320   13956   13619   13403
ELEV FTMSL        1824.8  1824.0  1823.8  1824.2  1824.3  1824.3  1824.1  1822.7  1821.4  1820.5    -1.3
DISCH KCFS          19.2    19.5    14.0    10.4    10.4    12.0    15.0    19.0    21.0    20.5
 POWER
AVE POWER MW                 220     158     117     118     136     169     213     233     225
PEAK POW MW                  411     410     411     412     412     411     406     401     398
ENERGY GWH         944.8   163.5   113.7    87.3    42.3    22.8    32.5   158.2   173.0   151.4

   --OAHE--
NAT INFLOW           402      60     120      66      30      14      16              12      84
DEPLETION            104      48       3      14      -6      -3      -3      13      16      22
CHAN STOR             -6      -1      26      17              -8     -14     -19      -9       2
EVAPORATION          286      58      73      64      29      14      16      34
REG INFLOW          6987    1152     903     643     316     162     228    1103    1278    1203
RELEASE             5907    1132     896     619     197     103     116     977    1027     840
STOR CHANGE         1080      20       7      24     118      59     111     126     251     363
STORAGE            14200   14220   14227   14251   14369   14428   14540   14665   14916   15280
ELEV FTMSL        1589.9  1590.0  1590.0  1590.1  1590.6  1590.8  1591.3  1591.8  1592.8  1594.2    +3.0
DISCH KCFS          20.6    18.4    15.1    10.1     6.6     7.4     7.3    15.9    16.7    15.1
 POWER
AVE POWER MW                 216     177     118      78      88      87     188     198     181
PEAK POW MW                  618     618     618     621     622     624     627     632     640
ENERGY GWH         844.6   160.5   127.3    88.1    28.2    14.8    16.6   139.9   147.6   121.6

  --BIG BEND--
EVAPORATION           74      15      19      17       7       3       4       9
REG INFLOW          5833    1117     878     602     190     100     112     968    1027     840
RELEASE             5810    1093     878     602     190     100     112     968    1027     840
STORAGE             1701    1725    1725    1725    1725    1725    1725    1725    1725    1725
ELEV FTMSL        1420.1  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5
DISCH KCFS          21.3    17.8    14.7     9.8     6.4     7.2     7.1    15.7    16.7    15.1
 POWER
AVE POWER MW                  84      73      50      33      37      36      79      82      72
PEAK POW MW                  523     538     538     538     538     538     538     538     524
ENERGY GWH         344.1    62.4    52.5    37.1    11.7     6.2     6.9    58.5    60.7    48.1

--FORT RANDALL--
NAT INFLOW           228      54      54      24      12       6       6              24      48
DEPLETION             34      15       7       1       1       0       1       3       3       3
EVAPORATION           76      19      21      15       6       3       3       8
REG INFLOW          5927    1113     903     609     195     102     115     958    1048     885
RELEASE             6202    1373    1522    1083     195     102     115     639     695     478
STOR CHANGE         -274    -260    -618    -474       0       0       0     318     353     407
STORAGE             3710    3450    2832    2357    2357    2357    2357    2676    3029    3436
ELEV FTMSL        1356.2  1353.2  1345.0  1337.5  1337.5  1337.5  1337.5  1342.7  1347.8  1353.0
DISCH KCFS          20.9    22.3    25.6    17.6     6.5     7.3     7.2    10.4    11.3     8.6
 POWER
AVE POWER MW                 187     204     132      48      54      53      78      88      70
PEAK POW MW                  345     310     276     276     276     276     300     324     344
ENERGY GWH         591.0   139.2   146.9    98.1    17.2     9.0    10.1    57.7    65.5    47.2

--GAVINS POINT--
NAT INFLOW           792     102     102     120      60      28      32     108     108     132
DEPLETION             48      11      21       7       5       2       3              -1
CHAN STOR             23      -3      -6      15      21      -2       0      -6      -2       5
EVAPORATION           27       5       7       6       3       1       1       3
REG INFLOW          6942    1456    1590    1205     268     125     143     738     802     615
RELEASE             6944    1445    1577    1205     268     125     143     738     802     641
STOR CHANGE           -2      11      13                                                     -26
STORAGE              380     391     404     404     404     404     404     404     404     378
ELEV FTMSL        1206.1  1206.5  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1206.0
DISCH KCFS          23.9    23.5    26.5    19.6     9.0     9.0     9.0    12.0    13.0    11.5
 POWER
AVE POWER MW                  79      89      67      31      31      31      42      45      40
PEAK POW MW                  112     113     113      76      76      76      76      76     111
ENERGY GWH         286.5    58.7    64.3    50.0    11.3     5.3     6.0    30.9    33.6    26.6

--GAVINS POINT - SIOUX CITY--
NAT INFLOW           486     114      84      66      33      15      18      36      24      96
DEPLETION             95      29      19       7       5       2       2      10      10      11
REGULATED FLOW AT SIOUX CITY
    KAF             7335    1530    1642    1264     296     138     158     764     816     726
    KCFS                    24.9    27.6    20.6    10.0    10.0    10.0    12.4    13.3    13.1

   --TOTAL--
NAT INFLOW          7746    1308    1188    1236     567     265     302     792     864    1224
DEPLETION           -311      75     -73       4     -39     -18     -21     -93    -125     -21
CHAN STOR              8       8      36      46      21     -14     -30     -56     -22      18
EVAPORATION         1014     208     260     225     101      47      54     118
STORAGE            45483   44986   44381   44170   44400   44483   44564   44511   44662   45199
SYSTEM POWER
AVE POWER MW                 861     758     524     346     390     440     699     758     687
PEAK POW MW                 2102    2083    2051    2016    2018    2019    2134    2157    2203
ENERGY GWH        3395.5   640.4   545.5   389.5   124.7    65.5    84.4   519.8   563.9   461.9
DAILY GWH                   20.7    18.2    12.6     8.3     9.4    10.6    16.8    18.2    16.5

                 INI-SUM   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB
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PRELIMINARY AUGUST 1, 1992 BASIC FORECAST
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Data: 07/30/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.5	2211.8	2212.2	2212.5	2212.9	2211.5	2210.4	2209.7
DISCH KCFS	7.2	6.0	3.0	3.0	3.5	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.8	1823.9	1823.2	1823.1	1822.7	1820.9	1819.3	1818.1
DISCH KCFS	19.2	18.0	13.5	10.0	11.3	19.0	20.0	20.0
OAHE								
ELEV FTMSL	1589.9	1589.4	1588.8	1588.6	1589.4	1589.7	1590.4	1591.6
DISCH KCFS	20.6	19.0	16.1	10.4	7.6	16.3	17.0	15.7
BIG BEND								
ELEV FTMSL	1420.1	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.3	18.3	15.6	10.0	7.3	16.1	17.0	15.7
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.3	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	20.9	22.6	25.9	18.0	7.3	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1206.1	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45483	44763	43934	43425	43567	43287	43225	43497
PEAK POWER MW		2098	2075	2039	2004	2115	2134	2178
ENERGY GWH	3374	637	541	391	275	523	546	462

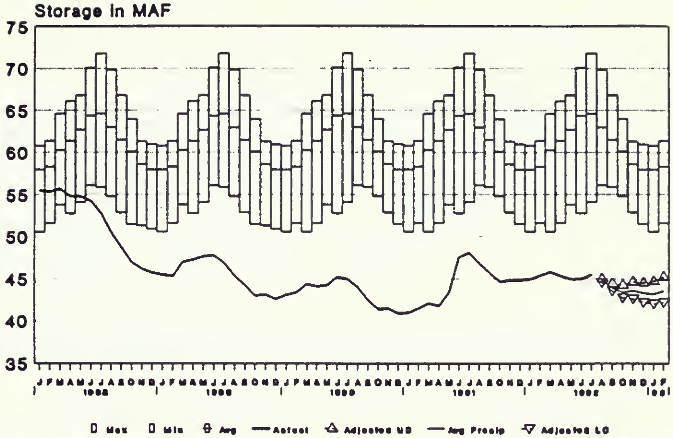
PRELIMINARY AUGUST 1, 1992 80 PERCENT OF BASIC FORECAST

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.5	2211.4	2211.5	2211.4	2211.5	2209.8	2208.4	2207.4
DISCH KCFS	7.2	6.0	3.0	3.0	3.5	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.8	1823.5	1822.4	1821.8	1821.3	1819.5	1817.6	1816.3
DISCH KCFS	19.2	18.0	13.5	10.0	10.0	18.0	20.0	19.0
OAHE								
ELEV FTMSL	1589.9	1589.1	1588.8	1587.7	1588.0	1587.9	1588.5	1589.6
DISCH KCFS	20.6	19.7	14.3	13.3	8.2	16.7	17.3	14.6
BIG BEND								
ELEV FTMSL	1420.1	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.3	18.9	13.8	12.9	7.8	16.4	17.3	14.6
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1343.1	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	20.9	23.0	26.2	18.3	7.4	11.0	11.8	7.8
GAVINS POINT								
ELEV FTMSL	1206.1	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	10.0
SYSTEM								
STORAGE 1000 AF	45483	44524	43452	42697	42644	42189	41989	42186
PEAK POWER MW		2095	2062	2029	1991	2098	2115	2157
ENERGY GWH	3358	646	520	426	272	517	548	429

PRELIMINARY AUGUST 1, 1992 120 PERCENT OF BASIC FORECAST

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.5	2212.0	2212.2	2213.1	2213.9	2213.1	2212.4	2212.5
DISCH KCFS	7.2	6.0	4.5	3.1	3.7	8.0	9.0	8.0
GARRISON								
ELEV FTMSL	1824.8	1824.0	1823.8	1824.2	1824.1	1822.7	1821.4	1820.5
DISCH KCFS	19.2	19.5	14.0	10.4	12.0	19.0	21.0	20.5
OAHE								
ELEV FTMSL	1589.9	1590.0	1590.0	1590.1	1591.3	1591.8	1592.8	1594.2
DISCH KCFS	20.6	18.4	15.1	10.1	7.0	15.9	16.7	15.1
BIG BEND								
ELEV FTMSL	1420.1	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.3	17.8	14.7	9.8	6.8	15.7	16.7	15.1
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.0	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	20.9	22.3	25.6	17.6	6.9	10.4	11.3	8.6
GAVINS POINT								
ELEV FTMSL	1206.1	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45483	44986	44381	44170	44564	44511	44662	45199
PEAK POWER MW		2102	2083	2051	2019	2134	2157	2203
ENERGY GWH	3396	640	546	390	275	520	564	462

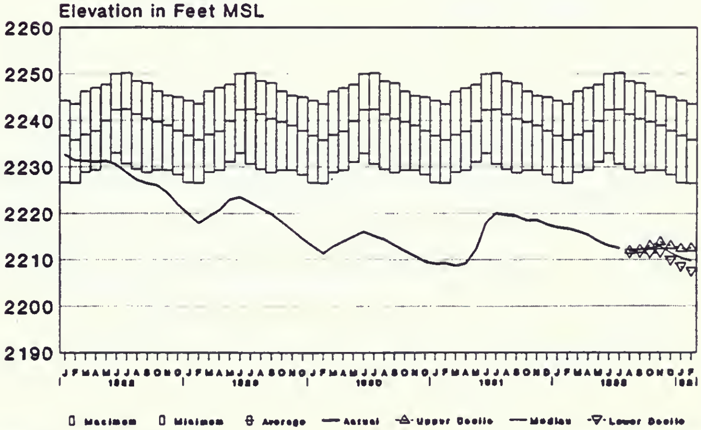
Missouri River Main Stem System
Actual and Forecasted Storage



Preliminary Aug 1, 1992 Forecast

Max, Min & Avg 1967-1987

Fort Peck
Actual & Forecasted Pool Elevations

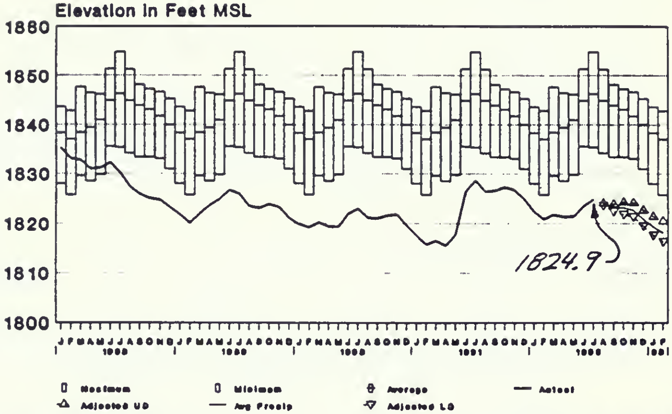


Preliminary Aug 1, 1992 Forecast

Max, Min & Avg 1967-1987

Garrison

Actual & Forecasted Pool Elevations



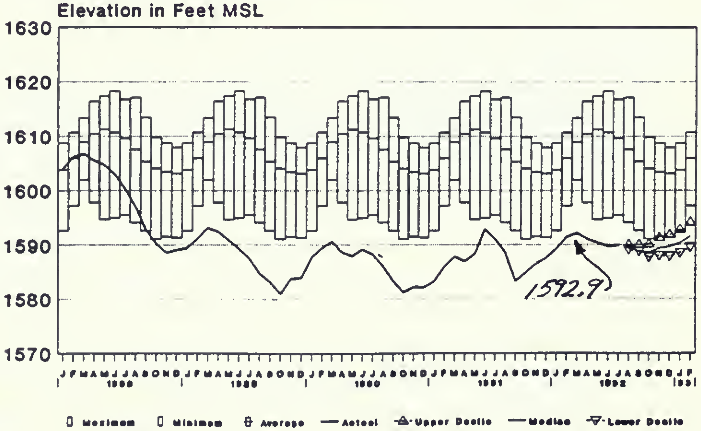
1824.9

Preliminary Aug 1, 1992 Forecast

Max, Min & Avg 1967-1987

Oahe

Actual & Forecasted Pool Elevations



1592.9

Preliminary Aug 1, 1992 Forecast

Max, Min & Avg 1967-1987

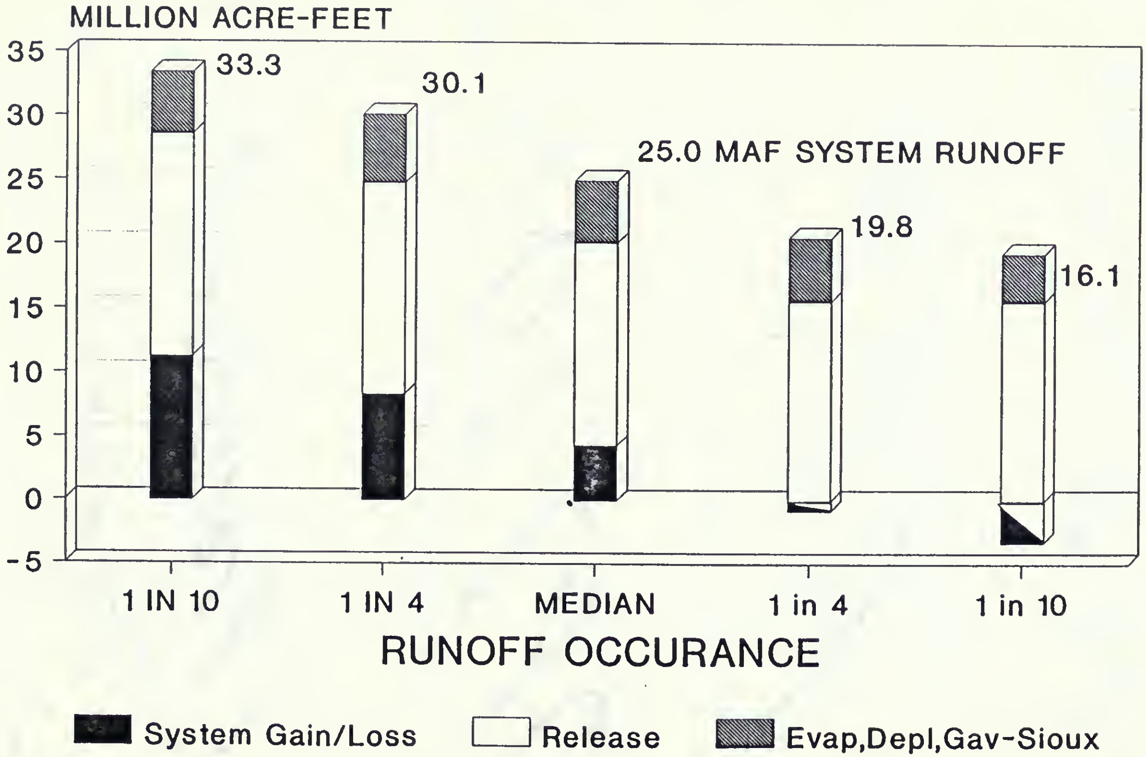
1992 — 1993

AOP OPTIONS

(Procedural Explanation)

1992-93 AOP WATER BUDGET OPTION 1

1 March 1993 thru 1 March 1994



SYSTEM RELEASE: 17.3, 16.4, 15.8, 15.7, 15.7

STORAGE GAINS: 11.3, 8.4, 4.4, -0.7, -3.3

1992-93 AOP STUDY WATER BUDGET (MAF)

1 MARCH 1993 thru 1 MARCH 1994

07/08/92

	UPPER DECILE	UPPER QUART	MEDIAN	LOWER QUART	LOWER DECILE
**********************	------	------	------	------	------
WATER SUPPLY	33.3	30.1	25.0	19.8	16.1
USES & LOSSES:					
AVINS SIOUX INFLOW	1.9	2.6	1.8	1.5	0.5
RES DEPLETIONS	1.6	1.5	1.5	1.6	1.5
-EVAPORATION	1.3	1.2	1.5	1.8	1.7
SYSTEM RELEASE	17.1	16.4	15.8	15.7	15.7
	----	----	----	----	----
STORAGE GAIN OR LOSS	11.4	8.4	4.4	-0.7	-3.3
MARCH 1993 STORAGE	44.0	44.0	41.9	40.7	40.1
	----	----	----	----	----
=1 MARCH 1994 STORAGE	55.4	52.4	46.3	40.0	36.8
**********************					
NAVIGATION SERVICE	Min/2800	Min/1200	Minimum	Minimum	Minimum
EASON LENGTH	8 Month	8 Month	8 Month	8 Month	8 Month
**********************					
ORT PECK					
NET INFLOW	9.1	8.0	6.8	5.1	3.9
-RELEASE	5.7	5.6	5.4	5.2	4.7
	----	----	----	----	----
=STORAGE GAIN/LOSS	3.4	2.4	1.3	-0.1	-0.8
ARRISON					
NET INFLOW	19.4	17.4	14.9	12.4	11.8
-RELEASE	16.0	14.6	13.5	12.7	13.0
	----	----	----	----	----
=STORAGE GAIN/LOSS	3.4	2.8	1.4	-0.4	-1.2
OAHE					
NET INFLOW	19.3	16.7	14.9	13.4	13.2
-RELEASE	14.7	13.6	13.3	13.7	14.4
	----	----	----	----	----
=STORAGE GAIN/LOSS	4.6	3.1	1.6	-0.2	-1.3
	====	====	====	====	====
TOTAL STOR GAIN/LOSS	11.4	8.4	4.4	-0.7	-3.3
**********************					

DATE OF STUDY 07/15/92 PRELIMININARY 1992-1993 AOP BASIC FORECAST - OPTION 1M 99001 9901 4 PAGE

TIME OF STUDY 07:26:20 STUDY NO

VALUES IN 1000 AF EXCEPT AS INDICATED 1993

	31JUL92 INI-SUM	31AUG	1992 30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	
--FORT PECK--											
NAT INFLOW	2150	220	270	340	175	82	93	300	310	360	
DEPLETION	-57	-49	-65	24	3	1	1	1	-3	30	
EVAPORATION	333	68	85	74	34	16	18	39			
MOD INFLOW	1874	201	250	242	139	65	74	260	313	330	
RELEASE	2641	369	280	215	104	49	79	492	553	500	
STOR CHANGE	-767	-167	-30	26	35	16	-5	-232	-240	-170	
STORAGE	10946	10779	10749	10775	10810	10826	10821	10589	10349	10179	
ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2211.6	2211.5	2210.1	2208.7	2207.6	-1.6
DISCH KCFS	8.0	6.0	4.7	3.5	3.5	3.5	5.0	8.0	9.0	9.0	
POWER											
AVE POWER MW		75	58	44	44	44	62	99	110	110	
PEAK POW MW		184	184	184	185	185	185	183	181	179	
ENERGY GWH	394.3	55.5	42.0	32.4	15.7	7.3	11.9	73.6	82.1	73.7	
--GARRISON--											
NAT INFLOW	2450	380	370	460	185	86	99	240	270	360	
DEPLETION	-362	-16	-92	-34	-40	-19	-21	-61	-56	-23	
CHAN STOR	-11	21	14	13	0		-16	-32	-11		
EVAPORATION	386	79	99	86	39	18	21	44			
REG INFLOW	5056	707	657	636	290	135	163	716	869	883	
RELEASE	6789	1168	803	619	299	153	238	1168	1230	1111	
STOR CHANGE	-1733	-461	-147	17	-9	-17	-75	-452	-361	-228	
STORAGE	14188	13727	13580	13597	13588	13571	13496	13044	12683	12455	
ELEV FTMSL	1823.6	1821.8	1821.2	1821.3	1821.2	1821.2	1820.9	1819.1	1817.6	1816.6	-7
DISCH KCFS	19.5	19.0	13.5	10.1	10.1	11.0	15.0	19.0	20.0	20.0	
POWER											
AVE POWER MW		212	150	112	112	122	166	208	216	214	
PEAK POW MW		403	401	401	401	400	399	393	387	384	
ENERGY GWH	900.1	157.5	107.8	83.1	40.2	20.5	31.8	154.5	160.7	143.9	
--OAHE--											
NAT INFLOW	315	40	90	55	25	12	13		10	70	
DEPLETION	104	48	3	14	-6	-3	-3	13	16	22	
CHAN STOR	-3	2	27	17	0	-5	-20	-20	-5		
EVAPORATION	361	74	92	80	36	17	19	42			
REG INFLOW	6637	1088	825	597	294	146	215	1093	1219	1159	
RELEASE	6666	1589	1027	685	215	112	126	1114	930	870	
STOR CHANGE	-29	-501	-201	-88	80	34	90	-21	289	289	
STORAGE	13724	13223	13022	12934	13014	13048	13138	13117	13406	13695	
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.0	1585.1	1585.5	1585.4	1586.6	1587.8	,1.6
DISCH KCFS	25.9	25.8	17.3	11.1	7.2	8.0	7.9	18.1	15.1	15.7	
POWER											
AVE POWER MW		297	197	127	82	92	91	207	174	181	
PEAK POW MW		597	593	591	592	593	595	595	601	607	
ENERGY GWH	924.4	220.8	141.9	94.5	29.7	15.4	17.4	154.0	129.1	121.6	
--BIG BEND--											
EVAPORATION	99	20	25	22	10	5	5	12			
REG INFLOW	6568	1569	1001	663	205	107	120	1103	930	870	
RELEASE	6568	1569	1001	663	205	107	120	1103	930	870	
STORAGE	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	
DISCH KCFS	25.9	25.5	16.8	10.8	6.9	7.7	7.6	17.9	15.1	15.7	
POWER											
AVE POWER MW		120	83	55	35	39	39	89	74	74	
PEAK POW MW		523	538	538	538	538	538	538	538	524	
ENERGY GWH	387.9	89.6	60.0	40.8	12.6	6.6	7.4	66.0	55.0	49.8	
--FORT RANDALL--											
NAT INFLOW	180	40	40	20	10	5	5		20	40	
DEPLETION	34	15	7	1	1	0	1	3	3	3	
EVAPORATION	101	25	28	20	8	4	4	11			
REG INFLOW	6612	1569	1006	660	206	107	121	1089	947	907	
RELEASE	6797	1739	1658	1102	206	107	121	658	707	500	
STOR CHANGE	-185	-170	-652	-441	0	0	0	431	240	407	
STORAGE	3620	3450	2798	2357	2357	2357	2357	2788	3028	3435	
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1337.5	1337.5	1344.4	1347.8	1353.0	
DISCH KCFS	25.7	28.3	27.9	17.9	6.9	7.7	7.6	10.7	11.5	9.0	
POWER											
AVE POWER MW		235	222	134	51	56	55	80	90	73	
PEAK POW MW		345	308	276	276	276	276	308	323	344	
ENERGY GWH	648.5	174.9	159.5	99.5	18.2	9.5	10.6	59.8	67.2	49.4	
--GAVINS POINT--											
NAT INFLOW	650	80	80	100	50	23	27	90	90	110	
DEPLETION	48	11	21	7	5	2	3		-1		
CHAN STOR	31	-5	1	19	21	-1	0	-6	-1	5	
EVAPORATION	36	7	9	8	4	2	2	4			
REG INFLOW	7395	1796	1709	1205	268	125	143	738	797	615	
RELEASE	7395	1783	1696	1205	268	125	143	738	797	641	
STOR CHANGE		13	13							-26	
STORAGE	378	391	404	404	404	404	404	404	404	378	
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0	
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	9.0	9.0	12.0	13.0	11.5	
POWER											
AVE POWER MW		96	96	67	31	31	31	42	45	40	
PEAK POW MW		112	113	113	76	76	76	76	76	111	
ENERGY GWH	303.7	71.5	68.9	50.0	11.3	5.3	6.0	30.9	33.3	26.6	
--GAVINS POINT - SIOUX CITY--											
NAT INFLOW	380	70	70	55	28	13	15	30	20	80	
DEPLETION	95	29	19	7	5	2	2	10	10	11	
REGULATED FLOW AT SIOUX CITY											
KAF	7680	1824	1747	1253	291	136	155	758	807	710	
KCFS		29.7	29.4	20.4	9.8	9.8	9.8	12.3	13.1	12.8	
--TOTAL--											
NAT INFLOW	6125	830	920	1030	473	221	252	660	720	1020	
DEPLETION	-138	38	-107	19	-33	-15	-18	-34	-31	43	
CHAN STOR	17	19	42	47	21	-6	-36	-58	-17	5	
EVAPORATION	1315	273	338	291	131	61	70	152			
STORAGE	44581	43295	42278	41793	41898	41931	41940	41666	41594	41866	
SYSTEM POWER											
AVE POWER MW		1035	806	538	355	384	444	724	709	692	
PEAK POW MW		2164	2137	2103	2068	2068	2069	2092	2106	2150	
ENERGY GWH	3558.9	769.9	580.1	400.4	127.7	64.6	85.2	538.7	527.4	464.9	
DAILY GWH		24.8	19.3	12.9	8.5	9.2	10.7	17.4	17.0	16.6	
	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	

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DATE OF STUDY 07/15/92        PRELIMINARY 1992-1993 AOP MEDIAN RUNOFF - OPTION 1M          99001  9901     4  PAGE      1

TIME OF STUDY 07:26:25                                                                                   STUDY NO      8
                                         VALUES IN 1000 AF EXCEPT AS INDICATED
                 28FEB93            1993                                                                            1994
                 INI-SUM   15MAR   22MAR   31MAR   30APR   31MAY   30JUN   31JUL   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB

 --FORT PECK--
NAT INFLOW          7396     263     123     158     677    1148    1680     850     368     312     393     199      93     106     329     334     363
DEPLETION            245      27      12      16     132     312     398      57    -121    -128     -30     -30     -14     -16    -117    -153    -101
EVAPORATION          376                                                      23      72      90      79      36      17      19      41
MOD INFLOW          6775     236     110     142     545     836    1282     770     417     350     344     192      90     102     405     487     466
RELEASE             5428     119      36      71     298     492     536     553     553     317     245     149     111     143     615     615     555
STOR CHANGE         1347     117      55      70     247     344     746     217    -136      33      98      43     -21     -40    -210    -128     -89
STORAGE            10179   10296   10350   10421   10668   11012   11759   11976   11840   11873   11972   12015   11993   11953   11743   11615   11526
ELEV FTMSL        2207.6  2208.3  2208.7  2209.1  2210.6  2212.7  2217.0  2218.3  2217.5  2217.7  2218.2  2218.5  2218.4  2218.1  2216.9  2216.2  2215.7
DISCH KCFS           9.0     4.0     4.0     4.0     5.0     8.0     9.0     9.0     9.0     5.3     4.0     5.0     8.0     9.0    10.0    10.0    10.0
 POWER
AVE POWER MW                  49      49      49      62      99     113     115     115      68      51      64     103     115     128     127     127
PEAK POW MW                  180     181     181     183     186     192     194     193     193     194     194     194     193     192     191     190
ENERGY GWH         831.4    17.6     8.2    10.6    44.4    73.9    81.6    85.5    85.6    49.1    38.1    23.1    17.2    22.1    94.9    94.4    85.0

 --GARRISON--
NAT INFLOW         10696     484     226     290     927    1356    2870    1713     613     507     467     204      95     109     202     266     366
DEPLETION            648       9       4       5      -4     339     573     333     -14    -102     -56     -68     -32     -36    -118    -116     -70
CHAN STOR            -10      34                     -11     -32     -11                      38      14     -10     -31     -10     -10
EVAPORATION          440                                                      26      84     106      92      42      19      22      48
REG INFLOW         15026     648     277     356    1218    1477    2822    1907    1098     858     690     368     187     255     877     997     991
RELEASE            13513     446     139     179     952    1230    1369    1414    1353     830     738     417     194     270    1230    1476    1277
STOR CHANGE         1513     202     138     178     266     247    1453     493    -254      28     -48     -49      -7     -15    -353    -479    -286
STORAGE            12455   12657   12795   12973   13239   13486   14939   15432   15178   15205   15157   15108   15101   15086   14732   14254   13968
ELEV FTMSL        1816.6  1817.5  1818.1  1818.8  1819.9  1820.8  1826.4  1828.2  1827.3  1827.4  1827.2  1827.1  1827.0  1827.0  1825.7  1823.8  1822.7
DISCH KCFS          20.0    15.0    10.0    10.0    16.0    20.0    23.0    23.0    22.0    14.0    12.0    14.0    14.0    17.0    20.0    24.0    23.0
 POWER
AVE POWER MW                 161     108     109     175     219     257     264     253     161     139     161     161     195     228     270     257
PEAK POW MW                  387     389     392     396     399     420     426     423     423     423     422     422     422     417     410     406
ENERGY GWH        1843.2    58.0    18.2    23.5   125.6   163.0   185.2   196.2   188.4   116.0   103.2    58.1    27.1    37.5   169.8   201.1   172.4

 --OAHE--
NAT INFLOW          2272     195      91     117     410     376     840     178      20      -5       5      -3      -1      -1     -30     -20     100
DEPLETION            428      19       9      12      40      51      88      94      57      15      -3       2       1       1       9      12      21
CHAN STOR            -15      24      24             -28     -19     -14               4      37       9      -9             -14     -14     -19       5
EVAPORATION          412                                                      26      81      99      85      38      18      20      44
REG INFLOW         14930     646     245     284    1294    1536    2107    1472    1239     747     670     364     174     233    1132    1425    1361
RELEASE            13338     185      88     280     858    1316    1236    1554    1686    1454     925     454     227     249     914    1193     717
STOR CHANGE         1592     461     156       4     435     220     870     -81    -447    -707    -255     -90     -52     -16     218     231     644
STORAGE            13695   14155   14312   14316   14751   14971   15841   15760   15313   14606   14351   14261   14209   14193   14411   14642   15287
ELEV FTMSL        1587.8  1589.7  1590.3  1590.4  1592.1  1593.0  1596.3  1596.0  1594.3  1591.5  1590.5  1590.1  1589.9  1589.9  1590.7  1591.7  1594.2
DISCH KCFS          15.7     6.2     6.3    15.7    14.4    21.4    20.8    25.3    27.4    24.4    15.0    15.3    16.3    15.7    14.9    19.4    12.9
 POWER
AVE POWER MW                  73      75     184     171     254     230     306     330     291     178     179     192     184     175     229     154
PEAK POW MW                  616     620     620     629     634     651     649     640     626     621     619     618     617     622     627     640
ENERGY GWH        1921.2    26.2    12.6    39.8   122.8   189.2   179.9   227.6   245.5   209.3   132.2    64.6    32.2    35.3   130.1   170.4   103.6

 --BIG BEND--
EVAPORATION          105                                                       6      20      25      22      10       5       5      12
REG INFLOW         13233     185      88     280     858    1316    1236    1547    1667    1429     903     444     222     243     903    1193     717
RELEASE            13233     185      88     280     858    1316    1236    1547    1667    1429     903     444     222     243     903    1193     717
STORAGE             1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725    1725
ELEV FTMSL        1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5  1420.5
DISCH KCFS          15.7     6.2     6.3    15.7    14.4    21.4    20.8    25.2    27.1    24.0    14.7    14.9    16.0    15.3    14.7    19.4    12.9
 POWER
AVE POWER MW                  29      30      74      68     101      98     118     128     113      73      76      81      78      73      94      61
PEAK POW MW                  516     515     515     515     515     515     515     515     522     538     538     538     538     538     537     524
ENERGY GWH         765.8    10.6     5.0    16.0    48.9    75.0    70.4    88.1    94.9    81.6    54.0    27.2    13.6    14.9    54.6    69.7    41.0

--FORT RANDALL--
NAT INFLOW          1476     178      83     107     354     120     158      91      56     108      62      20       9      11      56      31      33
DEPLETION             80       1       1       1       4       9      12      18      15       7       1       1       0       1       3       3       3
EVAPORATION          118                                                       8      25      32      25      10       4       5      10
REG INFLOW         14511     362     170     386    1208    1427    1382    1612    1682    1498     939     453     227     249     945    1221     747
RELEASE            14512     196     150     386    1208    1427    1382    1612    1682    1643    1583     772     360     273     627     719     489
STOR CHANGE           -1     165      20                       0       0       0       0    -145    -644    -318    -133     -24     318     502     258
STORAGE             3435    3600    3620    3620    3620    3620    3620    3620    3620    3475    2831    2513    2380    2356    2674    3176    3434
ELEV FTMSL        1353.0  1355.0  1355.2  1355.2  1355.2  1355.2  1355.2  1355.2  1355.2  1353.5  1345.0  1340.1  1337.9  1337.5  1342.7  1349.8  1353.0
DISCH KCFS           9.0     6.6    10.8    21.6    20.3    23.2    23.2    26.2    27.4    27.6    25.8    25.9    25.9    17.2    10.2    11.7     8.8
 POWER
AVE POWER MW                  56      92     182     171     195     195     220     229     230     206     195     189     125      76      92      72
PEAK POW MW                  352     353     353     353     353     353     353     353     346     310     288     278     276     300     332     344
ENERGY GWH        1436.0    20.0    15.4    39.3   123.1   145.1   140.6   163.7   170.6   165.5   153.0    70.3    31.8    23.9    56.6    68.4    48.7

--GAVINS POINT--
NAT INFLOW          1406      72      34      43     145     159     153      87      85      96     119      56      26      30     100      64     118
DEPLETION            114       2       1       1      -1      19      24      19      11      21       7       5       2       3              -1
CHAN STOR              0       5      -8     -21       2      -6       0      -6      -2       0       3       0       0      16      13      -3       5
EVAPORATION           38                                                       2       7       9       8       4       2       2       4
REG INFLOW         15765     271     175     407    1357    1562    1511    1672    1747    1709    1691     818     382     314     736     802     612
RELEASE            15765     271     175     407    1357    1562    1511    1672    1734    1696    1691     818     382     314     736     802     638
STOR CHANGE                                                                           13      13                                                     -26
STORAGE              378     378     378     378     378     378     378     378     391     404     404     404     404     404     404     404     378
ELEV FTMSL        1206.0  1206.0  1206.0  1206.0  1206.0  1206.0  1206.0  1206.0  1206.5  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1207.0  1206.0
DISCH KCFS          11.5     9.1    12.6    22.8    22.8    25.4    25.4    27.2    28.2    28.5    27.5    27.5    27.5    19.8    12.0    13.0    11.5
 POWER
AVE POWER MW                  31      43      76      76      84      84      90      94      96      93      76      76      67      41      45      39
PEAK POW MW                  111     111     111     111     111     111     111     112     113     113      76      76      76      76      76     111
ENERGY GWH         632.1    11.2     7.2    16.4    54.8    62.8    60.8    67.0    69.8    68.9    69.2    27.4    12.8    12.9    30.8    33.5    26.5

--GAVINS POINT - SIOUX CITY--
NAT INFLOW          1762     174      81     104     272     198     200     208     140     102      68      42      19      22      34      16      86
DEPLETION            215       7       3       4      20      25      23      34      29      20       8       5       2       3      10      10      11
REGULATED FLOW AT SIOUX CITY
  KAF              17317     438     253     507    1609    1735    1688    1846    1845    1778    1751     855     399     333     760     808     713
  KCFS                      14.7    18.2    28.4    27.0    28.2    28.4    30.0    30.0    29.9    28.5    28.7    28.7    21.0    12.4    13.1    12.8

 --TOTAL--
NAT INFLOW         25017    1366     637     819    2785    3357    5901    3127    1284    1120    1114     517     241     275     691     711    1068
DEPLETION     [illegible]     66      31      39     191     755    1118     555     -23    -167     -73     -84     -39     -45    -213    -245    -136
CHAN STOR     [illegible]     83      16     -21     -37     -56     -25      -6       2      74      26     -20     -31      -8     -12     -22      10
EVAPORATION         1490                                                      91     289     361     312     139      64      73     160
STORAGE            41866   42811   43181   43433   44381   45192   48262   48891   48066   47288   46439   46026   45811   45717   45689   45816   46317
SYSTEM POWER
AVE POWER MW                 399     396     674     722     953     998    1113    1149     959     739     752     802     764     721     857     710
PEAK POW MW                 2163    2168    2171    2187    2198    2242    2248    2236    2224    2198    2136    2125    2122    2144    2172    2216
ENERGY GWH        7429.6   143.6    66.6   145.6   519.7   709.0   718.5   828.1   854.7   690.3   549.8   270.8   134.7   146.7   536.7   637.6   477.2
DAILY GWH                    9.6     9.5    16.2    17.3    22.9    23.9    26.7    27.6    23.0    17.7    18.1    19.2    18.3    17.3    20.6    17.0

                 INI-SUM   15MAR   22MAR   31MAR   30APR   31MAY   30JUN   31JUL   31AUG   30SEP   31OCT   15NOV   22NOV   30NOV   31DEC   31JAN   28FEB
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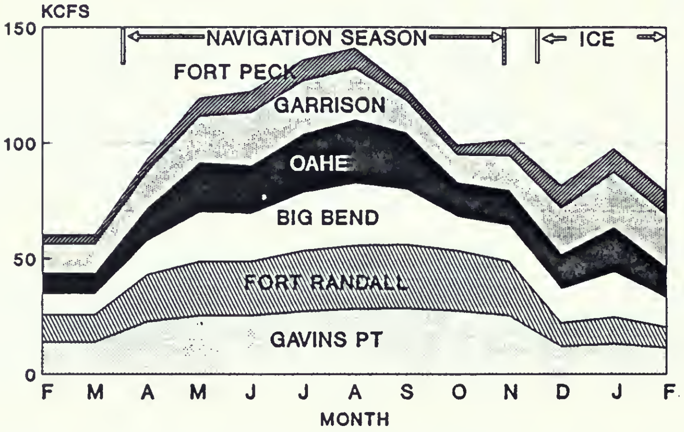
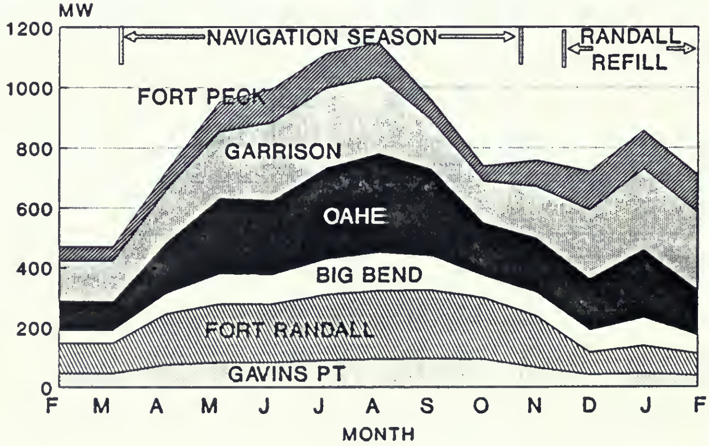
1993 MONTHLY PROJECT RELEASES
Option 1M



1993 PROJECT POWER
Option 1M



PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 1M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/15/92

		31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -----------	ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2210.1	2208.7	2207.6
	DISCH KCFS	8.0	6.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON -----------	ELEV FTMSL	1823.6	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1816.6
	DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE -----------	ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
	DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND -----------	ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
	DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL -----------	ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
	DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT -----------	ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
	DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM -----------	STORAGE 1000 AF	44581	43295	42278	41793	41940	41668	41594	41866
	PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
	ENERGY GWH	3559	770	580	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 1M

		28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -----------	ELEV FTMSL	2207.6	2209.1	2210.6	2212.7	2217.0	2218.3	2217.5	2217.7	2218.2	2218.1	2216.9	2216.2	2215.7
	DISCH KCFS	9.0	4.0	5.0	8.0	9.0	9.0	9.0	5.3	4.0	9.0	10.0	10.0	10.0
GARRISON -----------	ELEV FTMSL	1816.6	1818.8	1819.9	1820.8	1826.4	1828.2	1827.3	1827.4	1827.2	1827.0	1825.7	1823.8	1822.7
	DISCH KCFS	20.0	10.0	16.0	20.0	23.0	23.0	22.0	14.0	12.0	17.0	20.0	24.0	23.0
OAHE -----------	ELEV FTMSL	1587.8	1590.4	1592.1	1593.0	1596.3	1596.0	1594.3	1591.5	1590.5	1589.9	1590.7	1591.7	1594.2
	DISCH KCFS	15.7	15.7	14.4	21.4	20.8	25.3	27.4	24.4	15.0	15.7	14.9	19.4	12.9
BIG BEND -----------	ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
	DISCH KCFS	15.7	15.7	14.4	21.4	20.8	25.2	27.1	24.0	14.7	15.3	14.7	19.4	12.9
FORT RANDALL -----------	ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1342.7	1349.8	1353.0
	DISCH KCFS	9.0	21.6	20.3	23.2	23.2	26.2	27.4	27.6	25.8	17.2	10.2	11.7	8.8
GAVINS POINT -----------	ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
	DISCH KCFS	11.5	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM -----------	STORAGE 1000 AF	41866	43433	44381	45192	48262	48891	48066	47288	46439	45717	45689	45816	46317
	PEAK POWER MW		2171	2187	2198	2242	2248	2236	2224	2198	2122	2144	2172	2216
	ENERGY GWH	7430	356	520	709	719	828	855	690	550	552	537	638	477

Preliminary 1992-1993 AOP Regulation Studies
MBSA Technical Advisory Committee
August 3-4, 1992

Option 1

Inflow Forecast: Option 1UD - Upper Decile
Option 1UQ - Upper Quartile
Option 1M - Median
Option 1LQ - Lower Quartile
Option 1LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: In accordance with Master Water Control Manual (MM)
Length - 8 months (MM)
Service level - in accordance with MM

1993-94 winter release: Higher of minimum based on experience or as specified in MM

Option 2 (Committee)

Same as Option 1 except winter release reduced to 6,000 cfs

Inflow Forecast: Option 2UD - Upper Decile
Option 2UQ - Upper Quartile
Option 2M - Median
Option 2LQ - Lower Quartile
Option 2LD - Lower Decile

1992-93 winter release: 6,000 cfs

1993 navigation season: In accordance with MM
Length - 8 months
Service level - in accordance with MM

1993-94 winter release: 6,000 cfs

Option 3 (Dale Frink, ND)

Same as Option 1 except delay the start of navigation season to offset the volume of previous winter's release in excess of Master Manual criteria

Inflow Forecast: Option 3M - Median
Option 3LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Option 3M - May 15-Dec 1
Option 3LD - May 17-Dec 1
1993-94 winter release: Minimum based on experience

Option 4 (Committee)

Repeat adopted plan from 1991-1992 AOP

Inflow Forecast:
Option 4UD - Upper Decile (Same as 1UD)
Option 4UQ - Upper Quartile (Same as 1UQ)
Option 4M - Median
Option 4LQ - Lower Quartile
Option 4LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length -

Option	Delay in Opening	Early Closing
4UD	none	none
4UQ	none	none
4M	none	2 weeks
4LQ	none	4 weeks
4LD	none	5 weeks

Service level - in accordance with MM

1993-94 winter release: Higher of minimum based on experience or as specified in MM

Option 5 (Del Brosz, SD)

Delay opening and early closing of navigation season

Inflow Forecast:
Option 5UD - Upper Decile
Option 5UQ - Upper Quartile
Option 5M - Median
Option 5LQ - Lower Quartile
Option 5LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length -

Option	Delay in Opening	Early Closing
5UD	3 weeks	none
5UQ	3 weeks	none
5M	3 weeks	2 weeks
5LQ	3 weeks	4 weeks
5LD	3 weeks	5 weeks

Service level - minimum service

1993-94 winter release: Minimum based on experience

Option 6 (Del Bross, SD)

Delay opening of navigation season

Inflow Forecast:
Option 6UD - Upper Decile
Option 6UQ - Upper Quartile
Option 6M - Median
Option 6LQ - Lower Quartile
Option 6LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length -

Option	Delay in Opening	Early Closing
6UD	5 weeks	none
6UQ	5 weeks	none
6M	5 weeks	none
6LQ	5 weeks	none
6LD	5 weeks	none

Service level - minimum service

1993-94 winter release: Minimum based on experience

Option 7 (Brenda Schilf, Missouri Basin Tribes)

No support to navigation

Inflow Forecast:
Option 7M - Median
Option 7LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: No navigation

9,000 cfs Mar-Apr
24,000 cfs May-Sep
9,000 cfs Oct-Nov

Service level - none

1993-94 winter release: Minimum based on experience

Option 8 (Brenda Schilf, Missouri Basin Tribes)

No support to navigation, same as Option 7 except 20,000 cfs summer release

Inflow Forecast: Option 8M - Median
Option 8LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: No navigation

9,000 cfs Mar-Apr
20,000 cfs May-Sep
9,000 cfs Oct-Nov

Service level - none

1993-94 winter release: Minimum based on experience

Option 9 (Committee)

Split navigation season

Inflow Forecast: Option 9UD - Upper Decile
Option 9UQ - Upper Quartile
Option 9M - Median
Option 9LQ - Lower Quartile
Option 9LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length - Apr 1-Jul 14
Sep 1-Dec 1

Service level - minimum service
no support Jul 15-Aug 31 (24,000 cfs)

1993-94 winter release: Minimum based on experience

Option 10 (Committee)

Split navigation season, same as Option 9 except 20,000 cfs release Jul 15-Aug 31

Inflow Forecast:
Option 10UD - Upper Decile
Option 10UQ - Upper Quartile
Option 10M - Median
Option 10LQ - Lower Quartile
Option 10LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length - Apr 1-Jul 14
Sep 1-Dec 1

Service level - minimum service no support Jul 15-Aug 31 (20,000 cfs)

1993-94 winter release: Minimum based on experience

Option 11 (Jim Brown, IA)

Full service flows, 8-month navigation season

Inflow Forecast: Option 11M - Median

1992-93 winter release: Minimum based on experience

1993 navigation season: Length - 8 months

Service level - full service

1993-94 winter release: Minimum based on experience

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 1UD & 1UQ

Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/15/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK ------------								
ELEV FTMSL	2212.9	2212.1	2212.3	2215.0	2215.6	2212.5	2211.6	2211.3
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	9.0	9.5	9.0
GARRISON ------------								
ELEV FTMSL	1824.8	1823.3	1822.9	1823.3	1823.2	1822.0	1820.7	1819.9
DISCH KCFS	19.5	19.5	14.0	10.3	17.0	19.0	21.5	21.0
OAHE ------------								
ELEV FTMSL	1588.4	1586.7	1586.6	1586.2	1587.6	1588.2	1589.3	1590.9
DISCH KCFS	24.9	25.0	15.5	12.0	7.3	15.9	16.7	15.1
BIG BEND ------------								
ELEV FTMSL	1420.5	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.0	24.8	15.6	11.1	7.1	15.7	16.7	15.1
FORT RANDALL ------------								
ELEV FTMSL	1355.2	1353.2	1344.0	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	25.0	27.8	27.6	17.8	7.2	10.4	11.3	8.6
GAVINS POINT ------------								
ELEV FTMSL	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ------------								
STORAGE 1000 AF	45108	44000	43202	42995	43386	43332	43484	44018
PEAK POWER MW		2081	2056	2028	1997	2112	2135	2182
ENERGY GWH	3582	764	564	412	279	525	569	471

PRELIMINARY 1992-1993 AOP UPPER DECILE INFLOW - OPTION 1UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK ------------													
ELEV FTMSL	2211.3	2213.8	2216.3	2219.6	2226.3	2230.7	2230.8	2232.0	2232.9	2233.0	2232.1	2230.9	2231.1
DISCH KCFS	9.0	4.5	6.0	8.0	9.0	9.0	9.0	3.9	3.9	8.0	10.0	11.0	10.0
GARRISON ------------													
ELEV FTMSL	1819.9	1821.0	1825.5	1827.6	1834.9	1839.6	1839.2	1838.7	1838.0	1837.7	1837.0	1835.7	1834.6
DISCH KCFS	21.0	19.0	20.0	23.0	24.0	24.0	24.0	17.1	15.0	20.0	20.0	26.0	26.0
OAHE ------------													
ELEV FTMSL	1590.9	1595.8	1600.2	1601.6	1603.9	1603.7	1602.4	1601.3	1601.1	1601.1	1601.9	1602.8	1604.7
DISCH KCFS	15.1	16.3	17.1	22.0	19.0	27.7	29.7	27.1	19.0	19.4	18.7	20.8	16.8
BIG BEND ------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	16.3	17.1	22.0	19.0	27.6	29.4	26.8	18.7	19.1	18.6	20.8	16.8
FORT RANDALL ------------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	21.0	20.0	23.8	21.9	28.1	29.8	29.8	28.9	20.1	13.6	13.8	13.8
GAVINS POINT ------------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	25.8	26.3	30.0	31.0	31.3	30.3	22.7	14.9	15.4	16.1
SYSTEM ------------													
STORAGE 1000 AF	44018	46147	48951	50489	54480	56697	56243	55863	55148	54386	54729	54864	55379
PEAK POWER MW		2214	2257	2276	2322	2341	2335	2330	2307	2234	2259	2288	2329
ENERGY GWH	8442	419	601	764	720	912	952	778	670	643	639	735	610

PRELIMINARY 1992-1993 AOP UPPER QUARTILE INFLOW - OPTION 1UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK ------------													
ELEV FTMSL	2211.3	2214.4	2216.6	2219.6	2224.2	2225.6	2224.8	2225.7	2226.8	2227.1	2226.3	2225.6	2225.3
DISCH KCFS	9.0	4.5	6.0	8.0	9.0	9.0	9.0	5.0	4.5	8.0	10.0	11.0	10.0
GARRISON ------------													
ELEV FTMSL	1819.9	1821.2	1822.5	1823.4	1829.8	1834.0	1834.2	1834.3	1834.4	1834.4	1833.8	1832.1	1830.4
DISCH KCFS	21.0	18.0	19.0	21.0	23.0	23.0	23.0	16.5	13.7	18.0	20.0	25.0	25.0
OAHE ------------													
ELEV FTMSL	1590.9	1596.1	1598.8	1599.8	1602.3	1602.2	1601.1	1599.7	1599.3	1599.1	1599.5	1600.4	1602.4
DISCH KCFS	15.1	8.3	15.3	20.5	18.7	24.8	27.5	24.8	15.9	15.6	16.8	20.2	16.3
BIG BEND ------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	8.3	15.3	20.5	18.7	24.7	27.3	24.5	15.6	15.4	16.7	20.2	16.3
FORT RANDALL ------------													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	20.8	19.3	22.7	22.4	25.8	27.7	28.5	26.6	17.6	11.6	11.8	11.8
GAVINS POINT ------------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	25.6	25.8	28.4	29.4	29.7	28.7	20.5	12.7	13.2	14.3
SYSTEM ------------													
STORAGE 1000 AF	44018	46350	47810	48883	52159	53571	53187	52853	52327	51862	51931	52083	52388
PEAK POWER MW		2218	2239	2252	2293	2309	2305	2300	2280	2208	2230	2258	2297
ENERGY GWH	7880	405	564	715	702	839	889	737	602	573	591	691	573

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 1M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/15/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2210.1	2208.7	2207.6
DISCH KCFS	8.0	6.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON								
ELEV FTMSL	1823.6	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1816.6
DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE								
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	44581	43295	42278	41793	41940	41666	41594	41866
PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
ENERGY GWH	3559	770	580	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 1M

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2207.6	2209.1	2210.6	2212.7	2217.0	2218.3	2217.5	2217.7	2218.2	2218.1	2216.9	2216.2	2215.7
DISCH KCFS	9.0	4.0	5.0	8.0	9.0	9.0	9.0	5.3	4.0	9.0	10.0	10.0	10.0
GARRISON													
ELEV FTMSL	1816.6	1818.8	1819.9	1820.8	1826.4	1828.2	1827.3	1827.4	1827.2	1827.0	1825.7	1825.8	1822.7
DISCH KCFS	20.0	10.0	16.0	20.0	23.0	23.0	22.0	14.0	12.0	17.0	20.0	24.0	23.0
OAHE													
ELEV FTMSL	1587.8	1590.4	1592.1	1593.0	1596.3	1596.0	1594.3	1591.5	1590.5	1589.9	1590.7	1591.7	1594.2
DISCH KCFS	15.7	15.7	14.4	21.4	20.8	25.3	27.4	24.4	15.0	15.7	14.9	19.4	12.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	15.7	14.4	21.4	20.8	25.2	27.1	24.0	14.7	15.3	14.7	19.4	12.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	9.0	21.6	20.3	23.2	23.2	26.2	27.4	27.6	25.8	17.2	10.2	11.7	8.8
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	41866	43433	44381	45192	48262	48891	48066	47288	46439	45717	45689	45816	46317
PEAK POWER MW		2171	2187	2198	2242	2248	2236	2224	2198	2122	2144	2172	2216
ENERGY GWH	7430	356	520	709	719	828	855	690	550	552	537	638	477

PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 1LQ & 1LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.4	2208.7	2206.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON --------------								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.0
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE -------------------								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.5	11.3	8.1	16.5	17.3	14.6
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM -----------------								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40753	40343	40740
PEAK POWER MW		2065	2036	2002	1966	2072	2090	2132
ENERGY GWH	3501	763	581	403	268	310	344	431

PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 1LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.1	2208.7	2212.7	2214.7	2213.8	2211.6	2210.5	2209.8	2208.9	2207.0	2205.3	2204.8
DISCH KCFS	8.8	4.0	5.0	7.0	8.5	8.5	8.5	6.0	4.9	8.0	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1815.0	1816.9	1818.6	1818.5	1821.7	1823.0	1821.7	1820.9	1820.3	1818.8	1817.4	1815.1	1813.5
DISCH KCFS	19.0	10.0	15.0	20.0	19.5	19.5	19.5	14.1	12.0	19.0	20.0	23.0	22.0
OAHE -------------------													
ELEV FTMSL	1586.1	1587.4	1588.0	1588.0	1589.7	1588.4	1586.1	1583.3	1581.6	1581.2	1581.6	1582.3	1585.0
DISCH KCFS	14.6	18.6	17.1	22.1	20.6	24.9	27.1	24.5	16.1	16.9	15.8	19.3	11.5
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	18.6	17.1	22.1	20.6	24.8	26.7	24.0	15.7	16.4	15.6	19.3	11.5
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	21.4	19.6	23.3	22.9	25.4	27.0	27.8	26.1	17.2	10.6	11.5	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM -----------------													
STORAGE 1000 AF	40740	41924	42731	43359	44939	44777	43534	42367	41126	39981	39753	39604	40006
PEAK POWER MW		2147	2158	2163	2186	2183	2165	2148	2119	2036	2035	2078	2120
ENERGY GWH	7174	353	534	702	672	769	803	684	560	559	521	602	415

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 1LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.1	2208.6	2209.6	2210.0	2208.6	2206.5	2205.5	2205.0	2203.8	2202.0	2200.7	2200.2
DISCH KCFS	8.8	4.0	5.0	7.0	7.5	7.5	7.5	4.9	4.0	8.0	8.5	8.5	8.5
GARRISON --------------													
ELEV FTMSL	1815.1	1815.6	1817.3	1817.0	1820.3	1821.4	1820.0	1819.0	1818.0	1816.3	1814.5	1811.7	1809.8
DISCH KCFS	19.0	10.0	15.0	22.0	19.5	19.5	19.5	14.6	12.4	19.0	20.0	23.0	22.0
OAHE -------------------													
ELEV FTMSL	1586.1	1588.0	1587.2	1587.0	1586.9	1585.2	1582.3	1578.6	1576.6	1576.5	1577.0	1577.8	1580.6
DISCH KCFS	14.6	18.5	18.9	23.1	22.2	26.4	28.2	27.0	18.3	16.5	16.9	20.5	11.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	18.5	18.9	23.1	22.2	26.3	27.8	26.5	17.8	16.1	16.7	20.5	11.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1346.6	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	21.4	20.4	23.4	23.3	26.2	27.5	27.8	25.9	17.4	10.5	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM -----------------													
STORAGE 1000 AF	40741	41734	42224	42255	43109	42763	41408	40067	38797	37576	37289	37118	37453
PEAK POWER MW		2145	2149	2149	2161	2154	2133	2111	2084	1997	2014	2037	2078
ENERGY GWH	7223	363	560	726	679	775	802	698	573	528	520	592	406

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 2UD & 2UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/15/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.9	2212.4	2212.9	2213.8	2214.6	2214.1	2213.8	2214.2
DISCH KCFS	8.0	5.0	3.8	2.9	5.0	7.0	8.0	7.0
GARRISON --------------								
ELEV FTMSL	1824.8	1823.4	1823.3	1823.7	1823.8	1822.6	1821.8	1821.5
DISCH KCFS	19.5	18.0	12.0	10.1	13.0	17.0	18.0	17.0
OAHE ------------------								
ELEV FTMSL	1588.4	1586.4	1585.9	1585.5	1587.4	1589.0	1591.0	1592.9
DISCH KCFS	24.9	25.0	15.0	11.6	4.3	9.8	9.6	9.6
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.0	24.8	15.1	10.7	4.1	9.6	9.6	9.6
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1343.5	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	25.0	27.8	27.6	16.8	4.2	4.3	4.2	3.1
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	18.7	6.0	6.0	6.0	6.0
SYSTEM ----------------								
STORAGE 1000 AF	45108	44017	43219	43059	43645	43977	44569	45414
PEAK POWER MW		2080	2052	2026	1999	2120	2151	2202
ENERGY GWH	2948	742	535	392	205	368	383	324

PRELIMINARY 1992-1993 AOP UPPER DECILE INFLOW - OPTION 2UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2214.2	2216.7	2219.5	2223.1	2229.7	2234.0	2234.3	2235.3	2236.1	2236.2	2235.4	2234.4	2234.6
DISCH KCFS	7.0	4.0	5.0	7.0	8.5	8.5	8.5	4.3	4.3	8.0	9.5	10.5	10.0
GARRISON --------------													
ELEV FTMSL	1821.5	1823.5	1827.9	1830.0	1837.5	1842.2	1842.0	1841.4	1840.7	1840.3	1839.5	1838.5	1838.1
DISCH KCFS	17.0	17.0	19.0	21.0	22.5	22.5	22.5	17.6	15.5	20.0	20.0	24.0	23.0
OAHE ------------------													
ELEV FTMSL	1592.9	1596.9	1600.9	1601.8	1603.6	1602.9	1601.0	1599.8	1599.5	1599.8	1602.5	1605.1	1608.2
DISCH KCFS	9.6	16.9	17.6	22.6	19.7	28.6	30.6	28.0	19.9	14.7	9.7	11.4	6.6
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	9.6	16.9	17.6	22.6	19.7	28.5	30.3	27.7	19.6	14.4	9.8	11.4	6.6
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	3.1	21.6	20.5	24.4	22.6	29.0	30.7	30.7	29.8	15.5	4.6	4.4	3.6
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	6.0	23.3	23.3	26.4	27.0	30.9	31.9	32.2	31.2	18.7	6.0	6.0	6.0
SYSTEM ----------------													
STORAGE 1000 AF	45414	47594	50370	51875	55817	57976	57463	57006	56231	55706	56406	57127	58208
PEAK POWER MW		2233	2274	2290	2332	2349	2340	2334	2311	2239	2274	2313	2362
ENERGY GWH	7801	353	598	755	721	916	955	805	698	639	449	518	394

PRELIMINARY 1992-1993 AOP UPPER QUARTILE INFLOW - OPTION 2UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2214.2	2217.2	2219.9	2223.2	2227.9	2229.5	2229.1	2230.0	2231.0	2231.4	2230.9	2230.6	2230.6
DISCH KCFS	7.0	4.0	4.5	7.0	8.0	8.0	8.0	4.8	4.4	8.0	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1821.5	1823.4	1824.6	1825.5	1832.1	1836.3	1836.7	1836.7	1836.9	1836.8	1836.1	1834.9	1833.9
DISCH KCFS	18.0	16.0	18.0	20.0	21.0	21.0	21.0	16.5	13.0	18.0	20.0	22.0	21.0
OAHE ------------------													
ELEV FTMSL	1592.9	1597.4	1599.8	1600.5	1602.4	1601.7	1600.0	1598.3	1597.6	1597.4	1599.3	1601.1	1604.0
DISCH KCFS	9.6	9.5	15.5	21.0	19.3	25.7	28.4	25.7	16.8	12.4	10.0	13.0	7.9
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.3
DISCH KCFS	9.6	9.5	15.5	21.0	19.3	25.6	28.2	25.4	16.5	12.2	9.8	13.0	7.9
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	3.1	21.4	19.8	23.2	23.0	26.7	28.6	29.4	27.5	14.4	4.8	4.6	3.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	6.0	23.3	23.3	26.1	26.4	29.3	30.3	30.6	29.6	17.8	6.0	6.0	6.0
SYSTEM ----------------													
STORAGE 1000 AF	45410	47801	49237	50274	53519	54873	54429	54020	53436	52974	53489	54076	54852
PEAK POWER MW		2236	2257	2267	2305	2318	2312	2306	2283	2210	2241	2276	2323
ENERGY GWH	7286	353	553	712	693	834	883	755	614	563	442	508	376

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 2M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/15/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.3	2211.7	2211.7	2212.1	2212.6	2211.5	2210.8	2210.5
DISCH KCFS	8.8	3.0	4.0	3.0	4.0	7.0	7.0	7.0
GARRISON --------------								
ELEV FTMSL	1823.6	1822.1	1821.7	1821.6	1821.4	1820.1	1818.9	1818.4
DISCH KCFS	19.5	17.0	12.0	9.9	12.0	16.0	17.0	16.0
OAHE ------------------								
ELEV FTMSL	1588.0	1585.4	1584.3	1583.9	1585.3	1586.1	1588.3	1589.8
DISCH KCFS	25.9	25.8	16.7	10.7	4.9	12.0	8.1	10.2
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.3	10.4	4.6	11.8	8.1	10.2
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.1	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.0	4.6	4.6	4.5	3.5
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	18.7	6.0	6.0	6.0	6.0
SYSTEM ----------------								
STORAGE 1000 AF	44581	43315	42293	41857	42205	42306	42674	43257
PEAK POWER MW		2071	2041	2010	1979	2101	2122	2170
ENERGY GWH	2932	744	555	381	203	384	344	320

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 2M

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2210.5	2212.3	2213.8	2215.8	2220.0	2221.2	2220.4	2221.0	2221.8	2221.8	2221.0	2220.3	2220.1
DISCH KCFS	7.0	3.0	5.0	8.0	9.0	9.0	9.0	4.2	3.2	8.0	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1818.4	1820.6	1821.6	1822.6	1828.5	1830.6	1829.9	1830.2	1830.2	1829.8	1828.5	1827.2	1826.3
DISCH KCFS	16.0	10.0	16.0	20.0	21.0	21.0	21.0	11.9	10.2	17.0	20.0	22.8	21.0
OAHE ------------------													
ELEV FTMSL	1589.8	1592.3	1594.0	1594.8	1597.7	1596.9	1593.0	1591.8	1590.3	1589.8	1592.2	1594.4	1597.5
DISCH KCFS	10.2	15.8	14.4	21.4	20.8	25.3	27.4	24.4	15.0	12.3	8.8	12.3	7.5
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	10.2	15.8	14.4	21.4	20.8	25.2	27.1	24.0	14.7	11.9	8.6	12.3	7.5
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	3.5	21.7	20.3	23.2	23.2	26.2	27.4	27.6	25.8	13.8	4.1	4.6	3.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	6.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	16.8	6.0	6.0	6.0
SYSTEM ----------------													
STORAGE 1000 AF	43257	44887	45826	46637	49717	50344	49510	48741	47883	47203	47548	48111	48922
PEAK POWER MW		2192	2207	2218	2260	2265	2252	2239	2212	2137	2167	2204	2232
ENERGY GWH	6892	305	523	714	708	817	852	666	529	533	408	481	358

PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 2LQ & 2LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2211.5	2210.8	2211.1	2211.3	2211.7	2210.4	2209.1	2208.4
DISCH KCFS	8.8	5.0	5.0	3.0	3.5	7.0	8.0	7.0
GARRISON								
ELEV FTMSL	1822.4	1820.5	1819.5	1819.2	1818.8	1817.7	1817.0	1816.7
DISCH KCFS	19.0	18.0	13.0	9.9	10.0	14.0	15.0	14.0
OAHE								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1585.3	1585.9	1587.1	1588.0
DISCH KCFS	26.8	26.0	16.9	10.9	5.2	10.4	10.3	10.7
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	16.6	10.6	4.9	10.2	10.3	10.7
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.1	1337.3	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	17.3	4.9	4.9	4.8	3.9
GAVINS POINT								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	18.7	6.0	6.0	6.0	6.0
SYSTEM								
STORAGE 1000 AF	44044	42720	41650	41106	41388	41397	41621	42046
PEAK POWER MW		2064	2033	2000	1968	2082	2107	2152
ENERGY GWH	2918	754	557	385	201	347	363	311

PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 2LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2208.4	2210.2	2212.1	2216.0	2217.8	2216.7	2214.3	2213.9	2213.8	2213.1	2211.3	2209.7	2209.2
DISCH KCFS	7.0	3.0	4.0	7.0	9.0	9.0	9.0	4.1	3.3	7.0	9.0	10.0	9.0
GARRISON													
ELEV FTMSL	1816.7	1818.2	1820.1	1820.0	1823.5	1825.1	1824.3	1823.6	1823.1	1821.6	1820.3	1818.3	1817.3
DISCH KCFS	14.0	10.0	13.0	20.0	18.5	18.5	18.0	11.9	10.1	19.0	19.5	22.0	20.0
OAHE													
ELEV FTMSL	1588.0	1589.6	1589.8	1589.7	1591.1	1589.6	1587.0	1583.7	1581.5	1581.1	1583.1	1585.4	1588.5
DISCH KCFS	10.7	18.7	17.1	22.1	20.6	24.9	27.1	24.5	16.1	13.4	9.7	12.2	7.6
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	10.7	18.7	17.1	22.1	20.6	24.8	26.7	24.0	15.7	13.0	9.5	12.2	7.6
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	3.9	21.5	19.6	23.3	22.9	25.4	27.0	27.8	26.1	13.8	4.5	4.4	3.5
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	6.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	16.8	6.0	6.0	6.0
SYSTEM													
STORAGE 1000 AF	42046	43293	44110	44719	46298	46134	44887	43761	42489	41378	41514	41804	42427
PEAK POWER MW		2167	2177	2182	2205	2201	2183	2165	2134	2052	2078	2111	2157
ENERGY GWH	6693	313	513	706	673	771	801	653	533	537	400	458	335

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 2LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2208.3	2210.1	2212.2	2213.8	2214.1	2212.5	2210.3	2209.8	2209.6	2208.5	2206.6	2204.8	2204.5
DISCH KCFS	7.0	3.0	3.5	5.0	8.0	8.0	8.0	3.7	3.0	7.0	9.0	10.0	8.0
GARRISON													
ELEV FTMSL	1816.6	1817.2	1819.1	1818.6	1822.1	1823.6	1822.6	1822.0	1821.4	1819.7	1817.8	1815.6	1814.0
DISCH KCFS	14.0	10.0	13.0	20.5	18.5	18.5	18.5	11.8	10.0	19.0	21.0	22.5	21.0
OAHE													
ELEV FTMSL	1587.9	1589.7	1588.5	1587.9	1587.5	1585.6	1582.4	1578.0	1575.3	1575.2	1577.8	1580.5	1583.9
DISCH KCFS	10.7	18.6	18.9	23.1	22.2	26.4	28.2	27.0	18.3	13.1	10.8	13.5	7.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	10.7	18.6	18.9	23.1	22.2	26.3	27.8	26.5	17.8	12.7	10.6	13.5	7.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1346.6	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	3.9	21.4	20.4	23.4	23.3	26.2	27.5	27.8	25.9	14.0	4.4	4.6	3.5
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	6.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	16.8	6.0	6.0	6.0
SYSTEM													
STORAGE 1000 AF	41985	43062	43547	43582	44407	44059	42699	41378	40097	38912	38975	39232	39808
PEAK POWER MW		2164	2167	2165	2176	2170	2148	2125	2096	2009	2036	2070	2116
ENERGY GWH	6746	312	335	701	680	776	802	668	547	509	417	470	331

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                                   PRELIMINARY 1992-1993 AOP BASIC FORECAST -  OPTION 3M
                                   Elevations & Storages are for Date Shown
                                   Discharge & Energy are Period Values
                                   Date:    07/16/92

                                        1992                               1993
                31JUL92    31AUG       30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
          ELEV FTMSL     2212.3    2211.3    2211.1    2211.3    2211.5    2210.1    2208.7    2207.6
        DISCH KCFS          8.0       6.0       4.7       3.5       5.0       8.0       9.0       9.0

GARRISON --------------
          ELEV FTMSL     1823.6    1821.8    1821.2    1821.3    1820.9    1819.1    1817.6    1816.6
        DISCH KCFS         19.5      19.0      13.5      10.1      15.0      19.0      20.0      20.0

OAHE ------------------
          ELEV FTMSL     1588.0    1585.9    1585.0    1584.6    1585.5    1585.4    1586.6    1587.8
        DISCH KCFS         25.9      25.8      17.3      11.1       7.9      18.1      15.1      15.7

BIG BEND --------------
          ELEV FTMSL     1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
        DISCH KCFS         25.9      25.5      16.8      10.8       7.6      17.9      15.1      15.7

FORT RANDALL ----------
          ELEV FTMSL     1355.2    1353.2    1344.5    1337.5    1337.5    1344.4    1347.8    1353.0
        DISCH KCFS         25.7      28.3      27.9      17.9       7.6      10.7      11.5       9.0

GAVINS POINT  ---------
          ELEV FTMSL     1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
        DISCH KCFS         27.0      29.0      28.5      19.6       9.0      12.0      13.0      11.5

SYSTEM ----------------
        STORAGE 1000 AF   44581     43295     42278     41793     41940     41666     41594     41866
          PEAK POWER MW               2073      2045      2012      1977      2092      2108      2150
        ENERGY GWH         3559       770       580       400       278       539       527       465
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                                   PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 3M

                                        1993                                                                           1994
                28FEB93    31MAR      30APR     31MAY     30JUN     31JUL     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
          ELEV FTMSL     2207.6    2209.1    2210.6    2213.0    2217.7    2219.3    2218.9    2219.1    2219.6    2219.6    2218.6    2217.9    2217.5
        DISCH KCFS          9.0       4.0       5.0       7.0       8.0       8.0       8.0       5.2       3.9       8.0       9.5      10.0       9.5

GARRISON --------------
          ELEV FTMSL     1816.6    1819.1    1820.2    1821.0    1826.8    1828.8    1828.1    1828.5    1828.7    1828.4    1827.0    1825.4    1824.3
        DISCH KCFS         20.0      10.0      16.0      20.0      21.0      21.0      20.0      12.1      10.4      17.0      20.0      23.0      23.0

OAHE ------------------
          ELEV FTMSL     1587.8    1591.3    1596.2    1597.1    1599.9    1599.1    1597.0    1593.9    1592.5    1591.8    1592.7    1593.4    1595.9
        DISCH KCFS         15.7       0.7       0.8      20.9      20.8      25.3      27.4      24.4      15.0      15.7      14.9      19.4      12.9

BIG BEND --------------
          ELEV FTMSL     1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
        DISCH KCFS         15.7       0.7       0.8      20.9      20.8      25.2      27.1      24.0      14.7      15.3      14.7      19.4      12.9

FORT RANDALL ----------
          ELEV FTMSL     1353.0    1355.2    1355.2    1355.2    1355.2    1355.2    1355.2    1353.5    1345.0    1337.5    1342.7    1349.8    1353.0
        DISCH KCFS          9.0       6.7       6.7      22.7      23.2      26.2      27.4      27.6      25.8      17.2      10.2      11.7       8.8

GAVINS POINT  ---------
          ELEV FTMSL     1206.0    1206.0    1206.0    1206.0    1206.0    1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
        DISCH KCFS         11.5       9.0       9.1      24.5      25.4      27.2      28.2      28.5      27.5      19.8      12.0      13.0      11.5

SYSTEM ----------------
        STORAGE 1000 AF   41866     43760     45519     46372     49450     50077     49248     48454     47599     46876     46842     46968     47470
          PEAK POWER MW               2178      2209      2220      2262      2267      2255      2242      2216      2140      2162      2189      2232
        ENERGY GWH         6925       234       244       693       698       807       834       678       538       553       536       634       477
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PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTION 3LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.3	2208.7	2206.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON --------------								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.1
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE ------------------								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.4	11.3	8.1	16.5	17.3	14.6
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40753	40546	40741
PEAK POWER MW		2065	2036	2002	1966	2072	2090	2132
ENERGY GWH	3501	763	580	403	268	510	344	431

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 3LD

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.1	2208.6	2209.9	2210.6	2209.3	2207.5	2206.8	2206.5	2205.3	2203.8	2202.7	2202.4
DISCH KCFS	8.8	4.0	5.0	6.0	7.0	7.0	7.0	4.1	3.3	8.0	8.0	8.0	8.0
GARRISON --------------													
ELEV FTMSL	1815.1	1815.6	1817.3	1817.3	1820.5	1821.7	1820.3	1819.6	1819.0	1817.3	1815.5	1813.2	1811.7
DISCH KCFS	19.0	10.0	15.0	20.0	19.0	19.0	19.0	12.1	10.3	19.0	19.5	21.0	20.0
OAHE ------------------													
ELEV FTMSL	1586.1	1589.3	1591.9	1591.6	1591.3	1589.6	1586.7	1582.6	1580.1	1579.9	1580.2	1580.5	1582.6
DISCH KCFS	14.6	3.5	5.2	21.6	22.3	26.4	28.2	27.0	18.3	16.5	16.9	20.5	11.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.5	5.2	21.6	22.3	26.3	27.8	26.5	17.8	16.1	16.7	20.5	11.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1346.6	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	6.7	21.9	23.3	26.2	27.5	27.8	25.9	17.4	10.5	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	9.0	23.3	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40741	42080	43368	43514	44353	44006	42644	41306	40024	38780	38497	38334	38669
PEAK POWER MW		2152	2173	2174	2185	2178	2157	2135	2107	2020	2037	2058	2099
ENERGY GWH	6714	254	284	675	677	773	800	678	555	532	516	578	393

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 4M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2210.1	2208.7	2207.6
DISCH KCFS	8.0	6.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON --------------								
ELEV FTMSL	1823.6	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1818.6
DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE ------------------								
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ----------------								
STORAGE 1000 AF	44581	43295	42278	41793	41940	41666	41594	41866
PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
ENERGY GWH	3559	770	380	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 4M

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2207.6	2209.1	2210.6	2212.7	2217.0	2218.3	2217.5	2217.9	2218.7	2218.6	2217.7	2217.0	2216.8
DISCH KCFS	9.0	4.0	5.0	8.0	9.0	9.0	9.0	4.6	3.4	9.0	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1816.6	1818.8	1819.9	1821.1	1827.0	1829.0	1828.3	1828.3	1828.0	1827.8	1826.3	1824.6	1823.6
DISCH KCFS	20.0	10.0	16.0	19.0	21.5	21.5	21.5	13.7	11.8	17.0	20.0	23.8	22.0
OAHE ------------------													
ELEV FTMSL	1587.8	1590.4	1592.1	1592.7	1595.8	1595.1	1593.3	1591.1	1590.5	1591.3	1592.1	1592.8	1595.0
DISCH KCFS	15.7	15.7	14.4	21.4	20.8	25.3	27.4	21.5	13.2	7.7	15.2	19.4	12.9
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	15.7	14.4	21.4	20.8	25.2	27.1	21.1	12.8	7.3	15.0	19.4	12.9
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1351.4	1340.6	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	9.0	21.6	20.3	23.2	23.2	26.2	27.4	27.6	25.8	7.7	10.5	11.7	8.8
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	25.4	25.4	27.2	28.2	28.5	27.5	9.0	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	41866	43433	44381	45197	48269	48897	48069	47298	46447	46357	48321	46442	46953
PEAK POWER MW		2171	2187	2197	2241	2246	2234	2224	2181	2133	2155	2182	2225
ENERGY GWH	7149	356	520	701	707	815	850	648	517	407	535	632	463

PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 4LQ & 4LD

Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.4	2208.7	2206.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.8	1816.1	1815.0
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.5	11.3	8.1	16.5	17.3	14.6
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40753	40545	40740
PEAK POWER MW		2065	2038	2002	1966	2072	2090	2132
ENERGY GWH	3501	763	581	403	268	310	544	431

PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 4LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2205.6	2207.1	2208.7	2212.7	2214.9	2214.2	2212.1	2211.7	2211.5	2210.6	2208.7	2207.5	2207.0
DISCH KCFS	8.8	4.0	5.0	7.0	8.0	8.0	8.0	4.2	3.4	8.0	9.0	9.0	9.0
GARRISON													
ELEV FTMSL	1815.0	1816.9	1818.6	1818.5	1821.8	1823.0	1821.8	1821.2	1820.8	1820.0	1818.7	1816.7	1815.5
DISCH KCFS	19.0	10.0	15.0	20.0	19.0	19.0	18.5	11.7	9.9	17.0	20.0	21.0	20.0
OAHE													
ELEV FTMSL	1586.1	1587.4	1588.0	1588.0	1589.5	1588.1	1585.6	1583.9	1583.2	1584.0	1584.3	1584.5	1586.7
DISCH KCFS	14.6	18.6	17.1	22.1	20.6	24.9	27.1	17.7	10.6	8.5	16.1	19.3	11.5
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	18.6	17.1	22.1	20.6	24.8	26.7	17.2	10.2	8.1	15.9	19.3	11.5
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1348.4	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	21.4	19.6	23.3	22.9	25.4	27.0	27.8	22.3	7.4	10.9	11.5	7.4
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	40740	41924	42731	43359	44947	44785	43544	42399	41386	41213	40954	40826	41217
PEAK POWER MW		2147	2158	2163	2186	2182	2164	2149	2094	2057	2075	2098	2139
ENERGY GWH	6637	353	534	702	664	761	790	569	428	318	531	583	405

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 4LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2205.6	2207.1	2208.6	2209.6	2210.2	2209.0	2207.1	2206.5	2206.3	2205.2	2203.9	2203.0	2202.9
DISCH KCFS	8.8	4.0	5.0	7.0	7.0	7.0	7.0	3.9	3.2	7.0	7.5	7.5	7.5
GARRISON													
ELEV FTMSL	1815.1	1815.6	1817.3	1817.0	1820.3	1821.4	1820.0	1819.4	1818.8	1817.9	1816.0	1813.7	1812.1
DISCH KCFS	19.0	10.0	15.0	22.0	19.0	19.0	19.0	11.8	10.1	16.0	19.5	20.5	20.0
OAHE													
ELEV FTMSL	1588.1	1588.0	1587.2	1587.0	1586.8	1585.0	1582.6	1581.5	1580.0	1580.7	1580.8	1580.9	1583.1
DISCH KCFS	14.6	18.5	18.9	23.1	22.2	26.4	25.4	15.2	14.6	8.3	17.2	20.5	11.8
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	18.5	18.9	23.1	22.2	26.3	25.0	14.7	14.1	7.8	17.0	20.5	11.8
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	21.4	20.4	23.4	23.3	26.2	27.5	27.8	17.7	7.6	10.8	11.6	7.4
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	22.8	22.8	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	40741	41754	42224	42255	43117	42771	41416	40092	39319	39081	38759	38598	38931
PEAK POWER MW		2145	2149	2149	2160	2154	2136	2093	2064	2025	2041	2063	2103
ENERGY GWH	6589	363	560	726	671	766	760	530	432	302	518	571	390

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 5UD & 5UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.9	2212.1	2212.3	2213.0	2213.6	2212.5	2211.6	2211.3
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	9.0	9.5	9.0
GARRISON								
ELEV FTMSL	1824.8	1823.3	1822.9	1823.3	1823.2	1822.0	1820.7	1819.9
DISCH KCFS	19.5	19.5	14.0	10.3	17.0	19.0	21.5	21.0
OAHE								
ELEV FTMSL	1588.4	1586.7	1586.6	1586.2	1587.6	1588.2	1589.3	1590.9
DISCH KCFS	24.9	25.0	15.5	12.0	7.3	15.9	16.7	15.1
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.0	24.8	15.6	11.1	7.1	15.7	16.7	15.1
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.0	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	25.0	27.8	27.6	17.8	7.2	10.4	11.3	8.6
GAVINS POINT								
ELEV FTMSL	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45108	44000	43202	42995	43386	43332	43486	44018
PEAK POWER MW		2081	2056	2028	1997	2112	2135	2182
ENERGY GWH	3582	764	564	412	279	325	569	471

PRELIMINARY 1992-1993 AOP UPPER DECILE INFLOW - OPTION 5UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2211.3	2214.0	2216.8	2220.8	2227.6	2232.0	2232.3	2233.5	2234.6	2234.7	2234.1	2233.2	2233.7
DISCH KCFS	9.0	4.0	5.0	6.0	8.5	8.5	8.5	3.6	3.4	8.0	9.0	10.0	9.0
GARRISON													
ELEV FTMSL	1819.9	1822.0	1826.3	1828.1	1835.5	1840.2	1839.9	1839.9	1840.0	1839.8	1839.0	1837.9	1837.3
DISCH KCFS	21.0	14.0	20.0	22.0	23.0	23.0	23.0	14.0	10.5	20.0	20.0	24.0	23.0
OAHE													
ELEV FTMSL	1590.9	1596.0	1601.3	1602.5	1604.7	1604.9	1604.0	1602.9	1602.4	1602.7	1604.1	1605.1	1607.2
DISCH KCFS	15.1	1.3	12.9	21.7	18.1	24.8	26.9	24.3	16.2	16.5	15.8	18.4	12.1
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	1.3	12.9	21.7	18.1	24.7	26.6	24.0	15.9	16.2	15.7	18.4	12.1
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	6.0	15.8	23.5	20.9	25.2	27.0	27.0	26.1	17.2	10.7	11.4	9.1
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.0	18.2	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	44018	46496	49536	51106	55136	57528	57243	57031	56490	56068	56397	56688	57468
PEAK POWER MW		2219	2266	2284	2329	2351	2346	2343	2322	2251	2279	2310	2354
ENERGY GWH	7497	269	505	733	690	841	883	695	568	588	573	662	492

PRELIMINARY 1992-1993 AOP UPPER QUARTILE INFLOW - OPTION 5UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2211.3	2214.5	2217.1	2220.8	2225.3	2226.7	2226.0	2227.1	2228.4	2228.2	2227.6	2227.4	2227.0
DISCH KCFS	9.0	4.0	5.0	6.0	9.0	9.0	9.0	4.1	3.8	8.0	9.0	10.0	10.0
GARRISON													
ELEV FTMSL	1819.9	1821.8	1822.9	1823.7	1829.9	1834.2	1834.4	1834.9	1835.2	1835.6	1834.9	1833.2	1832.0
DISCH KCFS	21.0	14.0	18.5	20.0	23.0	23.0	23.0	14.1	11.7	18.0	20.0	24.0	23.0
OAHE													
ELEV FTMSL	1590.9	1596.7	1600.2	1601.0	1603.5	1603.6	1602.8	1601.2	1600.6	1600.5	1601.0	1601.7	1603.9
DISCH KCFS	15.1	4.6	11.0	20.4	18.3	23.5	26.3	23.6	14.7	13.0	16.1	20.1	13.4
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	4.6	11.0	20.4	18.3	23.5	26.1	23.3	14.4	14.7	15.9	20.1	13.4
FORT RANDALL													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	5.9	15.0	22.6	22.0	24.6	26.5	27.3	25.4	16.9	10.9	11.7	8.9
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.1	18.2	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	44018	46699	48402	49492	52767	54253	53941	53694	53235	52814	52955	53098	53558
PEAK POWER MW		2223	2249	2260	2301	2318	2315	2311	2291	2220	2243	2271	2312
ENERGY GWH	7349	267	465	688	696	815	867	687	553	565	569	673	505

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                                            PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 5M
                                            Elevations & Storages are for Date Shown
                                            Discharge & Energy are Period Values
                                            Date:    07/16/92

                                           1992                                     1993
                      31JUL92    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK -------------
        ELEV FTMSL     2212.3   2211.3   2211.1   2211.3   2211.5   2210.1   2208.7   2207.6
       DISCH KCFS         8.0      6.0      4.7      3.5      3.0      8.0      9.0      9.0

GARRISON --------------
        ELEV FTMSL     1823.4   1821.8   1821.2   1821.3   1820.9   1819.1   1817.6   1816.6
       DISCH KCFS        19.5     19.0     13.5     10.1     15.0     19.0     20.0     20.0

OAHE ------------------
        ELEV FTMSL     1588.0   1585.9   1585.0   1584.6   1585.5   1585.4   1586.6   1587.8
       DISCH KCFS        25.9     25.8     17.3     11.1      7.9     18.1     15.1     15.7

BIG BEND --------------
        ELEV FTMSL     1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
       DISCH KCFS        25.9     25.5     16.8     10.8      7.6     17.9     15.1     15.7

FORT RANDALL ----------
        ELEV FTMSL     1355.2   1333.2   1344.5   1337.5   1337.5   1344.4   1347.8   1353.0
       DISCH KCFS        25.7     28.3     27.9     17.9      7.6     10.7     11.5      9.0

GAVINS POINT  ---------
        ELEV FTMSL     1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
       DISCH KCFS        27.0     29.0     28.5     19.6      9.0     12.0     13.0     11.5

SYSTEM ----------------
    STORAGE 1000 AF     44581    43295    42278    41793    41940    41666    41594    41866
        PEAK POWER MW             2073     2045     2012     1977     2092     2106     2150
     ENERGY GWH          3559      770      580      400      278      539      527      465
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                                            PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 5M

                                           1993                                                                      1994
                      28FEB93    31MAR    30APR    31MAY    30JUN    31JUL    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB
FORT PECK -------------
        ELEV FTMSL     2207.6   2209.1   2210.8   2213.2   2217.7   2219.1   2218.5   2219.1   2219.9   2219.8   2219.0   2218.1   2217.6
       DISCH KCFS         9.0      4.0      4.5      7.0      8.5      8.5      8.5      4.2      3.2      9.0      9.0     10.5     10.0
GARRISON --------------
        ELEV FTMSL     1816.6   1819.0   1820.0   1821.0   1828.8   1828.8   1827.9   1828.1   1828.0   1827.8   1826.3   1825.8   1824.3
       DISCH KCFS        20.0     10.0     16.0     19.0     21.5     21.5     21.5     12.4     10.6     17.0     20.0     22.0     21.0
OAHE ------------------
        ELEV FTMSL     1587.8   1591.4   1594.1   1594.7   1597.7   1597.0   1595.2   1592.8   1591.9   1592.6   1593.4   1593.9   1595.9
       DISCH KCFS        15.7      1.2     10.2     21.5     20.8     25.3     27.4     21.5     13.2      7.7     15.2     19.4     12.9
BIG BEND --------------
        ELEV FTMSL     1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
       DISCH KCFS        15.7      1.2     10.2     21.5     20.8     25.2     27.1     21.1     12.8      7.3     15.0     19.4     12.9
FORT RANDALL ----------
        ELEV FTMSL     1353.0   1355.3   1355.3   1355.3   1355.3   1355.3   1355.3   1351.5   1340.7   1337.6   1342.8   1349.9   1353.1
       DISCH KCFS         9.0      6.7     16.0     23.4     23.2     26.2     27.4     27.6     25.8      7.7     10.5     11.7      8.8
GAVINS POINT  ---------
        ELEV FTMSL     1206.0   1206.0   1206.0   1206.0   1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
       DISCH KCFS        11.5      9.0     18.2     25.4     25.4     27.2     28.2     28.5     27.5      9.0     12.0     13.0     11.5
SYSTEM ----------------
    STORAGE 1000 AF     41866    43759    44967    45779    48847    49475    48644    47875    47021    46921    46884    47005    47511
        PEAK POWER MW             2178     2198     2208     2251     2256     2244     2233     2191     2142     2164     2190     2233
     ENERGY GWH          6910      240      429      697      704      813      848      633      505      408      536      630      466
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PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 5LQ & 5LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK ------------								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.4	2208.7	2208.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON --------------								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.0
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE ------------------								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.5	11.3	8.1	16.5	17.3	14.6
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40753	40543	40740
PEAK POWER MW		2065	2036	2002	1966	2072	2090	2132
ENERGY GWH	3501	763	581	403	268	510	544	431

PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 5LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK ------------													
ELEV FTMSL	2205.6	2207.3	2208.8	2213.2	2215.4	2214.7	2212.7	2212.3	2212.3	2211.4	2209.7	2208.5	2208.2
DISCH KCFS	8.8	3.5	5.0	6.0	8.0	8.0	8.0	3.9	3.1	8.0	8.5	9.0	8.5
GARRISON --------------													
ELEV FTMSL	1815.0	1816.8	1818.4	1818.3	1821.8	1823.2	1822.2	1821.5	1820.9	1820.1	1818.9	1817.2	1816.3
DISCH KCFS	19.0	10.0	15.0	19.5	18.0	18.0	18.0	11.8	10.0	17.0	19.0	20.0	18.5
OAHE ------------------													
ELEV FTMSL	1586.1	1588.7	1590.4	1590.2	1591.5	1589.8	1587.2	1585.6	1584.9	1585.7	1585.7	1585.7	1587.5
DISCH KCFS	14.6	3.6	12.8	22.3	20.6	24.9	27.1	17.7	10.6	8.5	16.1	19.3	11.5
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.6	12.8	22.3	20.6	24.8	26.7	17.2	10.2	8.1	15.9	19.3	11.5
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1348.4	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	15.4	23.4	22.9	25.4	27.0	27.8	22.3	7.4	10.9	11.5	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	18.2	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40740	42254	43308	43942	43521	45359	44113	42965	41948	41771	41521	41387	41786
PEAK POWER MW		2153	2170	2174	2197	2193	2174	2160	2104	2067	2084	2107	2147
ENERGY GWH	6388	240	450	694	658	755	789	568	427	319	520	577	392

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 5LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK ------------													
ELEV FTMSL	2205.6	2207.5	2209.4	2210.7	2211.1	2209.7	2207.8	2207.3	2207.1	2206.2	2205.0	2204.0	2204.0
DISCH KCFS	8.8	3.0	4.0	6.0	7.5	7.5	7.0	3.8	3.1	7.0	7.0	8.0	7.0
GARRISON --------------													
ELEV FTMSL	1815.1	1815.8	1817.2	1816.9	1820.5	1822.0	1820.9	1820.2	1819.6	1818.6	1816.6	1814.4	1813.0
DISCH KCFS	19.0	10.0	15.0	21.0	18.0	18.0	18.0	11.9	10.1	16.0	19.5	20.5	19.0
OAHE ------------------													
ELEV FTMSL	1586.1	1589.0	1589.2	1588.8	1588.3	1586.3	1583.7	1582.6	1581.1	1581.7	1581.9	1582.0	1583.9
DISCH KCFS	14.6	3.6	14.7	23.2	22.2	26.4	25.4	15.2	14.6	8.3	17.2	20.5	11.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.6	14.7	23.2	22.2	26.3	25.0	14.7	14.1	7.8	17.0	20.5	11.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1353.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	16.2	23.5	23.3	26.2	27.5	27.8	17.7	7.6	10.8	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	18.2	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40741	42089	42812	42840	43686	43339	41986	40655	39878	39637	39318	39147	39495
PEAK POWER MW		2151	2160	2159	2170	2163	2145	2102	2074	2035	2050	2072	2112
ENERGY GWH	6343	235	467	714	670	765	734	331	432	301	516	578	380

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                                   PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 6UD & 6UQ
                                   Elevations & Storages are for Date Shown
                                   Discharge & Energy are Period Values
                                   Date:    07/16/92

                                           1992                            1993
                      31JUL92    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK ----------
        ELEV FTMSL     2212.9   2212.1   2212.3   2213.0   2213.6   2212.5   2211.6   2211.3
       DISCH KCFS         8.0      6.0      4.5      3.5      5.0      9.0      9.5      9.0

GARRISON -----------
        ELEV FTMSL     1824.8   1823.3   1822.9   1823.3   1823.2   1822.0   1820.7   1819.9
       DISCH KCFS        19.5     19.5     14.0     10.3     17.0     19.0     21.5     21.0

OAHE ---------------
        ELEV FTMSL     1588.4   1586.7   1586.6   1586.2   1587.6   1588.2   1589.3   1590.9
       DISCH KCFS        24.9     25.0     15.5     12.0      7.3     15.9     16.7     15.1

BIG BEND -----------
        ELEV FTMSL     1420.5   1420.5   1420.1   1420.7   1420.5   1420.5   1420.5   1420.5
       DISCH KCFS        25.0     24.8     15.6     11.1      7.1     15.7     16.7     15.1

FORT RANDALL -------
        ELEV FTMSL     1355.2   1353.2   1344.0   1337.5   1337.5   1342.7   1347.8   1353.0
       DISCH KCFS        25.0     27.8     27.6     17.8      7.2     10.4     11.3      8.6

GAVINS POINT  ------
        ELEV FTMSL     1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1206.0
       DISCH KCFS        27.0     29.0     28.5     19.6      9.0     12.0     13.0     11.5

SYSTEM -------------
     STORAGE 1000 AF    45108    44000    43202    42995    43384    43332    43484    44018
       PEAK POWER MW              2081     2036     2028     1995     2112     2135     2182
      ENERGY GWH         3582      764      564      412      279      523      569      471
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                                             PRELIMINARY 1992-1993 AOP UPPER DECILE INFLOW - OPTION 6UD

                                           1993                                                                             1994
                      28FEB93    31MAR    30APR    31MAY    30JUN    31JUL    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK ----------
        ELEV FTMSL     2211.3   2214.0   2216.8   2220.8   2227.8   2232.3   2232.8   2234.0   2235.2   2235.3   2234.6   2233.8   2234.3
       DISCH KCFS         9.0      4.0      5.0      6.0      8.0      8.0      8.0      3.3      3.1      8.0      9.0     10.0      9.0

GARRISON -----------
        ELEV FTMSL     1819.9   1822.0   1826.5   1828.5   1836.0   1840.8   1840.6   1840.4   1840.4   1840.2   1839.4   1838.5   1837.7
       DISCH KCFS        21.0     14.0     19.0     21.0     22.0     22.0     22.0     14.4     10.8     20.0     20.0     24.0     23.0

OAHE ---------------
        ELEV FTMSL     1590.9   1596.0   1602.5   1603.5   1605.4   1605.4   1604.3   1603.3   1602.8   1603.1   1604.5   1605.5   1607.6
       DISCH KCFS        15.1      1.3      6.2     21.9     18.1     24.8     26.9     24.3     16.2     16.5     15.8     18.4     12.1

BIG BEND -----------
        ELEV FTMSL     1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
       DISCH KCFS        15.1      1.3      6.2     21.9     18.1     24.7     26.6     24.0     15.9     16.2     15.7     18.4     12.1

FORT RANDALL -------
        ELEV FTMSL     1353.0   1355.2   1355.2   1355.2   1355.2   1355.2   1355.2   1353.5   1345.1   1337.5   1342.7   1349.8   1353.0
       DISCH KCFS         8.6      6.0      9.1     23.7     20.9     25.2     27.0     27.0     26.1     17.2     10.7     11.4      9.1

GAVINS POINT  ------
        ELEV FTMSL     1206.0   1206.0   1206.0   1206.0   1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
       DISCH KCFS        11.5      9.0     11.7     25.4     25.4     27.2     28.2     28.5     27.5     19.8     12.0     13.0     11.5

SYSTEM -------------
     STORAGE 1000 AF    44018    46496    49940    51497    55533    57924    57638    57416    56874    56449    56778    57068    57849
       PEAK POWER MW              2219     2273     2290     2335     2356     2351     2347     2326     2255     2283     2314     2358
      ENERGY GWH         7317      269      359      730      678      828      871      696      568      589      574      663      492
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                                             PRELIMINARY 1992-1993 AOP UPPER QUARTILE INFLOW - OPTION 6UQ

                                           1993                                                                             1994
                      28FEB93    31MAR    30APR    31MAY    30JUN    31JUL    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK ----------
        ELEV FTMSL     2211.3   2214.5   2217.1   2220.8   2225.5   2227.0   2226.4   2227.8   2229.2   2229.0   2228.3   2228.0   2227.7
       DISCH KCFS         9.0      4.0      5.0      6.0      8.5      8.5      8.5      3.5      3.2      8.0      9.5     10.0     10.0

GARRISON -----------
        ELEV FTMSL     1819.9   1822.0   1823.2   1823.9   1830.3   1834.6   1834.9   1835.4   1835.6   1835.9   1835.3   1833.6   1832.4
       DISCH KCFS        21.0     13.0     18.5     20.0     22.0     22.0     22.0     13.6     11.3     18.0     20.0     24.0     23.0

OAHE ---------------
        ELEV FTMSL     1590.9   1596.5   1601.3   1602.1   1604.4   1604.3   1603.3   1601.6   1600.9   1600.9   1601.4   1602.1   1604.3
       DISCH KCFS        15.1      4.6      4.3     20.6     18.3     23.5     26.3     23.6     14.7     15.0     16.1     20.1     13.4

BIG BEND -----------
        ELEV FTMSL     1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
       DISCH KCFS        15.1      4.6      4.3     20.6     18.3     23.5     26.1     23.3     14.4     14.7     15.9     20.1     13.4

FORT RANDALL -------
        ELEV FTMSL     1353.0   1355.0   1355.2   1355.2   1355.2   1355.2   1355.2   1353.5   1345.1   1337.5   1342.7   1349.8   1353.0
       DISCH KCFS         8.6      5.9      8.3     22.9     22.0     24.6     26.5     27.3     25.4     16.9     10.9     11.7      8.9

GAVINS POINT  ------
        ELEV FTMSL     1206.0   1206.0   1206.0   1206.0   1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
       DISCH KCFS        11.5      9.1     11.7     25.4     25.4     27.2     28.2     28.5     27.5     19.8     12.0     13.0     11.5

SYSTEM -------------
     STORAGE 1000 AF    44018    46704    48802    49879    53164    54650    54336    54084    53624    53195    53331    53478    53938
       PEAK POWER MW              2223     2258     2267     2307     2324     2320     2316     2295     2224     2248     2275     2317
      ENERGY GWH         7171      259      327      694      684      803      855      678      545      573      575      673      506
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                                   PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 6M
                                   Elevations & Storages are for Date Shown
                                   Discharge & Energy are Period Values
                                   Date:    07/16/92

                                                  1992                                    1993
                           31JUL92     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK ---------------
          ELEV FTMSL        2212.3    2211.5    2211.1    2211.3    2211.5    2210.1    2208.7    2207.6
        DISCH KCFS             8.0       6.0       4.7       3.5       5.0       8.0       9.0       9.0

GARRISON ----------------
          ELEV FTMSL        1823.8    1821.8    1821.2    1821.3    1820.9    1819.1    1817.6    1816.6
        DISCH KCFS            19.5      19.0      13.5      10.1      15.0      19.0      20.0      20.0

OAHE --------------------
          ELEV FTMSL        1588.0    1585.9    1585.0    1584.6    1585.5    1585.4    1586.6    1587.8
        DISCH KCFS            25.9      25.8      17.3      11.1       7.9      18.1      15.1      15.7

BIG BEND ----------------
          ELEV FTMSL        1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
        DISCH KCFS            25.9      25.5      16.8      10.8       7.6      17.9      15.1      15.7

FORT RANDALL ------------
          ELEV FTMSL        1355.2    1353.2    1344.5    1337.5    1337.5    1344.4    1347.8    1353.0
        DISCH KCFS            25.7      28.3      27.9      17.9       7.6      10.7      11.5       9.0

GAVINS POINT  -----------
          ELEV FTMSL        1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
        DISCH KCFS            27.0      29.0      28.5      19.6       9.0      12.0      13.0      11.5

SYSTEM ------------------
      STORAGE 1000 AF        44581     43295     42278     41793     41940     41666     41594     41866
         PEAK POWER MW                  2073      2045      2012      1977      2092      2106      2150
       ENERGY GWH             3559       770       580       400       278       539       527       465
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                                   PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 6M

                                                  1993                                                                                          1994
                           28FEB93     31MAR     30APR     31MAY     30JUN     31JUL     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK ---------------
          ELEV FTMSL        2207.6    2209.1    2210.8    2213.2    2217.5    2218.8    2218.0    2218.6    2219.4    2219.3    2218.4    2217.7    2217.2
        DISCH KCFS             9.0       4.0       4.5       7.0       9.0       9.0       9.0       4.2       3.2       9.0       9.0      10.0      10.0

GARRISON ----------------
          ELEV FTMSL        1816.6    1819.0    1820.0    1821.0    1826.8    1828.7    1827.9    1827.9    1827.7    1827.5    1826.0    1824.7    1824.0
        DISCH KCFS            20.0      10.0      16.0      19.0      22.0      22.0      22.0      13.3      11.4      17.0      20.0      22.0      21.0

OAHE --------------------
          ELEV FTMSL        1587.8    1591.4    1595.7    1596.2    1599.2    1598.7    1597.0    1594.8    1593.6    1592.2    1593.0    1593.5    1595.8
        DISCH KCFS            15.7       1.2       3.4      21.8      20.8      25.3      27.4      21.5      15.3      17.1      14.9      19.4      12.9

BIG BEND ----------------
          ELEV FTMSL        1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
        DISCH KCFS            15.7       1.2       3.4      21.8      20.8      25.2      27.1      21.1      14.9      16.8      14.7      19.4      12.9

FORT RANDALL ------------
          ELEV FTMSL        1353.0    1355.3    1355.3    1355.3    1355.3    1355.3    1355.3    1351.5    1342.8    1337.7    1342.8    1349.9    1353.1
        DISCH KCFS             9.0       6.7       9.3      23.6      23.2      26.2      27.4      27.6      25.8      17.2      10.2      11.7       8.8

GAVINS POINT  -----------
          ELEV FTMSL        1206.0    1206.0    1206.0    1206.0    1206.0    1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
        DISCH KCFS            11.5       9.0      11.7      25.4      25.4      27.2      28.2      28.5      27.5      19.8      12.0      13.0      11.5

SYSTEM ------------------
      STORAGE 1000 AF        41866     43759     45366     46166     49227     49854     49021     48252     47397     46661     46643     46769     47270
         PEAK POWER MW                  2178      2206      2215      2258      2264      2252      2243      2207      2139      2160      2187      2229
       ENERGY GWH             7015       240       293       702       714       824       859       643       540       580       530       625       465
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PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 6LQ & 6LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.4	2208.7	2206.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON --------------								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.0
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE ------------------								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.5	11.3	8.1	16.5	17.3	14.6
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40753	40545	40740
PEAK POWER MW		2065	2036	1966	2057	2072	2090	2132
ENERGY GWH	3501	763	581	403	268	510	544	431

PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 6LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.3	2208.8	2213.2	2215.2	2214.3	2212.1	2211.8	2211.7	2210.8	2209.0	2207.3	2206.7
DISCH KCFS	8.8	3.5	5.0	6.0	8.5	8.5	8.5	3.9	3.2	8.0	9.0	10.0	9.5
GARRISON --------------													
ELEV FTMSL	1815.0	1816.8	1818.4	1818.1	1821.4	1822.6	1821.3	1820.6	1820.0	1819.2	1818.0	1816.2	1815.1
DISCH KCFS	19.0	10.0	15.0	20.0	19.5	19.5	19.5	12.1	10.3	17.0	19.5	21.0	20.0
OAHE ------------------													
ELEV FTMSL	1586.1	1588.7	1592.0	1591.8	1593.5	1592.2	1590.0	1588.5	1587.0	1583.5	1583.7	1583.9	1584.1
DISCH KCFS	14.6	3.6	6.1	22.5	20.6	24.9	27.1	17.7	14.4	18.2	15.8	19.3	11.5
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.6	6.1	22.5	20.6	24.8	26.7	17.2	14.0	17.8	15.6	19.3	11.5
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1348.4	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	8.7	23.6	22.9	25.4	27.0	27.8	26.1	17.2	10.6	11.5	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	11.7	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40740	42254	43708	44327	45896	45733	44486	43346	42095	40930	40692	40551	40947
PEAK POWER MW		2153	2179	2182	2206	2202	2184	2170	2110	2052	2070	2093	2134
ENERGY GWH	6744	240	315	703	675	774	808	573	507	631	520	590	408

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 6LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.5	2209.4	2210.7	2211.1	2209.7	2207.6	2207.1	2206.9	2206.0	2204.0	2202.5	2201.8
DISCH KCFS	8.8	3.0	4.0	6.0	7.5	7.5	7.5	3.9	3.1	7.0	9.0	9.0	9.0
GARRISON --------------													
ELEV FTMSL	1815.1	1815.5	1817.0	1816.6	1819.9	1821.0	1819.6	1818.8	1817.9	1816.8	1815.1	1812.8	1811.3
DISCH KCFS	19.0	11.0	15.0	21.0	19.5	19.5	19.5	13.0	11.0	17.0	20.0	22.0	21.0
OAHE ------------------													
ELEV FTMSL	1586.1	1589.2	1591.1	1590.6	1590.4	1588.8	1586.7	1585.9	1582.5	1578.8	1579.2	1579.7	1582.2
DISCH KCFS	14.6	3.6	8.0	23.4	22.2	26.4	25.4	15.2	22.7	17.9	16.9	20.5	11.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.6	8.0	23.4	22.2	26.3	25.0	14.7	22.3	17.5	16.7	20.5	11.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	9.5	23.7	23.3	26.2	27.5	27.8	25.9	17.4	10.5	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	11.7	25.4	25.4	27.2	28.2	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40741	42084	43211	43226	44066	43719	42358	41030	39753	38534	38218	38032	38387
PEAK POWER MW		2151	2169	2167	2179	2173	2156	2113	2075	2013	2030	2033	2094
ENERGY GWH	6808	243	332	720	683	780	773	542	603	607	528	593	406

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 7M
Elevations & Storages are for Date Shown
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Date: 07/16/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.3	2211.5	2211.1	2211.5	2211.5	2210.1	2208.7	2207.6
DISCH KCFS	8.0	8.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON								
ELEV FTMSL	1823.4	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1816.6
DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE								
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	44581	43295	42278	41795	41940	41666	41594	41866
PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
ENERGY GWH	3559	770	580	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 7M

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK													
ELEV FTMSL	2207.6	2209.1	2211.0	2213.8	2218.6	2220.3	2220.1	2221.1	2221.9	2222.5	2222.0	2222.0	2222.1
DISCH KCFS	9.0	4.0	4.0	6.0	7.5	7.5	7.3	3.0	3.0	7.0	8.0	8.0	8.0
GARRISON													
ELEV FTMSL	1816.6	1819.4	1821.0	1822.2	1828.3	1830.7	1830.1	1830.2	1830.2	1830.1	1829.1	1828.4	1828.0
DISCH KCFS	20.0	10.0	13.0	17.0	18.5	18.5	18.5	11.6	10.0	15.0	17.0	18.8	18.0
OAHE													
ELEV FTMSL	1587.8	1591.1	1595.1	1595.5	1598.1	1597.5	1596.6	1597.2	1598.2	1598.8	1598.9	1598.4	1599.7
DISCH KCFS	15.7	0.7	1.7	20.4	19.4	22.0	20.4	7.3	4.4	7.4	15.2	19.4	12.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	0.7	1.7	20.4	19.4	21.9	20.1	6.9	4.0	7.1	15.0	19.4	12.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1340.9	1337.6	1337.6	1342.8	1349.9	1353.1
DISCH KCFS	9.0	6.6	7.6	22.2	21.8	23.0	23.1	23.1	7.8	7.4	10.5	11.7	8.8
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.0	10.0	24.0	24.0	24.0	24.0	24.0	10.0	9.0	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	41866	43759	45489	46375	49531	50358	49786	49271	49500	49740	49692	49833	50329
PEAK POWER MW		2177	2207	2217	2260	2267	2262	2228	2220	2186	2206	2231	2271
ENERGY GWH	5625	227	230	648	645	713	691	405	241	300	510	582	433

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			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.3	2208.7	2206.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.1
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.4	11.3	8.1	16.5	17.3	14.6
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40753	40546	40741
PEAK POWER MW		2065	2036	1966	2057	2072	2090	2132
ENERGY GWH	3501	763	580	403	268	510	544	431

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 7LD

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK													
ELEV FTMSL	2205.6	2207.5	2209.6	2211.4	2212.3	2211.3	2209.8	2209.6	2209.4	2208.8	2208.0	2207.3	2207.4
DISCH KCFS	8.8	3.0	3.5	4.5	6.3	6.3	6.0	3.0	3.0	6.0	6.0	7.0	7.0
GARRISON													
ELEV FTMSL	1815.1	1815.8	1817.9	1817.4	1821.2	1823.0	1822.2	1821.4	1820.8	1820.2	1818.6	1816.8	1815.9
DISCH KCFS	19.0	10.0	12.0	20.0	16.0	15.5	15.5	11.8	10.0	13.0	17.0	18.8	17.0
OAHE													
ELEV FTMSL	1586.1	1589.0	1590.6	1590.2	1589.6	1587.8	1585.7	1585.6	1586.7	1586.8	1586.2	1585.7	1587.0
DISCH KCFS	14.6	3.5	6.2	22.0	20.8	23.2	21.2	10.7	4.8	8.3	17.2	20.5	11.8
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.5	6.2	22.0	20.8	23.0	20.8	10.2	4.4	7.9	17.0	20.5	11.8
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	7.7	22.3	21.8	22.9	23.2	23.3	8.0	7.6	10.8	11.6	7.4
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	10.0	24.0	24.0	24.0	24.0	24.0	10.0	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	40741	42092	43338	43440	44371	44226	43127	42041	41847	41603	41277	41106	41441
PEAK POWER MW		2151	2170	2169	2181	2177	2163	2125	2109	2069	2084	2104	2142
ENERGY GWH	5489	234	269	670	618	670	642	438	238	287	494	557	372

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 8M
Elevations & Storages are for Date Shown
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	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2210.1	2208.7	2207.6
DISCH KCFS	8.0	6.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON -------------								
ELEV FTMSL	1823.6	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1816.6
DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE ------------------								
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ----------------								
STORAGE 1000 AF	44581	43295	42278	41793	41940	41646	41594	41866
PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
ENERGY GWH	3559	770	580	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 8M

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2207.6	2209.1	2211.0	2213.8	2218.9	2221.0	2221.2	2222.1	2222.9	2223.5	2223.3	2223.6	2224.0
DISCH KCFS	9.0	4.0	4.0	6.0	6.5	6.5	6.2	3.0	3.0	7.0	7.0	7.0	7.0
GARRISON -------------													
ELEV FTMSL	1816.6	1819.4	1821.0	1822.7	1829.1	1831.9	1831.7	1831.7	1831.7	1831.6	1830.5	1829.6	1829.4
DISCH KCFS	20.0	10.0	13.0	15.0	16.0	16.0	16.0	11.7	10.1	15.0	16.0	17.0	16.0
OAHE ------------------													
ELEV FTMSL	1587.8	1591.1	1595.2	1596.1	1599.0	1598.8	1598.3	1599.3	1600.7	1601.3	1601.1	1600.5	1601.4
DISCH KCFS	15.7	0.7	1.2	16.3	15.4	18.0	16.4	5.0	2.3	7.5	15.2	19.4	12.9
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	0.7	1.2	16.3	15.4	17.9	16.1	4.6	1.9	7.1	15.0	19.4	12.9
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1342.5	1337.6	1337.6	1342.8	1349.9	1353.1
DISCH KCFS	9.0	6.6	7.1	18.1	17.8	19.0	19.1	19.1	7.5	7.4	10.5	11.7	8.8
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.0	9.5	20.0	20.0	20.0	20.0	20.0	9.5	9.0	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	41866	43759	45520	46668	50075	51147	50818	50512	50758	50994	50958	51099	51600
PEAK POWER MW		2177	2208	2222	2268	2279	2277	2253	2239	2205	2224	2248	2287
ENERGY GWH	5045	227	219	546	535	599	578	348	214	303	495	568	412

PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTION 8LD
Elevations & Storages are for Date Shown
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	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2211.3	2210.4	2210.2	2210.2	2210.3	2208.7	2206.9	2205.6
DISCH KCFS	8.8	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON -------------								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.1
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE -----------------								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.4	11.3	8.1	16.3	17.3	14.6
BIG BEND -------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL ---------								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ---------------								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40733	40546	40741
PEAK POWER MW		2065	2036	2002	1966	2072	2090	2132
ENERGY GWH	3501	763	580	403	268	510	544	431

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 8LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.5	2209.7	2212.0	2213.1	2212.4	2211.1	2210.9	2210.7	2210.2	2209.5	2209.2	2209.6
DISCH KCFS	8.8	3.0	3.0	3.5	5.5	5.5	5.5	3.0	3.0	4.5	6.0	6.0	6.0
GARRISON -------------													
ELEV FTMSL	1815.1	1815.8	1818.0	1818.0	1821.7	1823.2	1822.4	1821.9	1821.3	1820.6	1819.8	1818.5	1817.7
DISCH KCFS	19.0	10.0	11.0	17.5	15.5	15.5	15.5	10.1	10.1	13.0	14.0	15.5	15.0
OAHE -----------------													
ELEV FTMSL	1586.1	1589.0	1590.5	1590.5	1590.7	1589.9	1588.9	1589.4	1590.5	1590.5	1589.3	1588.1	1588.9
DISCH KCFS	14.6	3.5	5.7	17.9	16.8	19.2	17.2	6.7	4.4	8.3	17.2	20.5	11.8
BIG BEND -------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	3.5	5.7	17.9	16.8	19.0	16.8	6.2	4.0	7.9	17.0	20.5	11.8
FORT RANDALL ---------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	7.2	18.2	17.9	18.9	19.2	19.3	7.6	7.6	10.8	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	9.5	20.0	20.0	20.0	20.0	20.0	9.5	9.0	12.0	13.0	10.0
SYSTEM ---------------													
STORAGE 1000 AF	40741	42092	43379	43746	44903	45001	44141	43291	43107	42874	42544	42381	42714
PEAK POWER MW		2151	2170	2173	2189	2190	2181	2148	2132	2092	2103	2124	2162
ENERGY GWH	4927	234	247	557	528	582	558	346	231	285	474	533	352

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 9UD & 9UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.8	2212.1	2212.3	2213.0	2213.6	2212.5	2211.6	2211.3
DISCH KCFS	8.8	6.0	4.5	3.5	5.0	9.0	9.5	9.0
GARRISON --------------								
ELEV FTMSL	1824.8	1825.3	1822.9	1825.3	1825.2	1822.0	1820.7	1819.9
DISCH KCFS	19.5	19.5	14.0	10.3	17.0	19.0	21.5	21.0
OAHE ------------------								
ELEV FTMSL	1588.4	1586.7	1586.6	1586.2	1587.6	1588.2	1589.3	1590.9
DISCH KCFS	24.9	25.0	15.5	12.0	7.3	13.9	16.7	15.1
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.0	24.8	15.6	11.1	7.1	15.7	16.7	15.1
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.0	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	25.0	27.8	27.6	17.8	7.2	10.4	11.3	8.6
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ----------------								
STORAGE 1000 AF	45108	44000	43202	42995	43386	43332	43486	44018
PEAK POWER MW		2081	2056	2028	1997	2112	2135	2182
ENERGY GWH	3582	764	564	412	279	525	569	471

PRELIMINARY 1992-1993 AOP UPPER DECILE INFLOW - OPTION 9UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2211.3	2213.8	2216.6	2220.3	2227.1	2231.5	2232.0	2233.3	2234.5	2234.6	2234.0	2233.2	2233.6
DISCH KCFS	9.0	4.5	5.0	7.0	8.5	8.5	8.0	3.2	3.2	8.0	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1819.9	1822.5	1827.2	1829.5	1837.1	1841.9	1841.7	1841.1	1840.3	1839.7	1838.9	1837.8	1837.1
DISCH KCFS	21.0	12.0	18.0	20.0	22.0	22.0	22.0	16.8	14.7	20.0	20.0	24.8	23.0
OAHE ------------------													
ELEV FTMSL	1590.9	1594.5	1598.5	1599.5	1601.9	1602.5	1601.9	1601.3	1601.7	1602.5	1603.9	1604.9	1607.0
DISCH KCFS	15.1	16.3	17.1	20.9	16.6	22.0	24.1	24.4	16.2	16.5	15.8	18.5	12.1
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	16.3	17.1	20.9	16.6	21.9	23.8	24.1	15.9	16.2	15.6	18.5	12.1
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	21.0	20.0	22.7	19.5	22.4	24.2	27.1	26.1	17.2	10.7	11.4	9.1
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	24.8	24.0	24.4	25.4	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	44018	46180	48972	50577	54698	57265	57158	56924	56376	55970	56299	56589	57370
PEAK POWER MW		2213	2255	2273	2320	2344	2342	2339	2320	2250	2277	2308	2352
ENERGY GWH	7534	370	376	708	651	770	809	716	604	605	572	662	491

PRELIMINARY 1992-1993 AOP UPPER QUARTILE INFLOW - OPTION 9UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2211.3	2214.5	2217.1	2220.1	2224.6	2226.0	2225.3	2226.5	2227.8	2228.3	2227.8	2227.5	2227.2
DISCH KCFS	9.0	4.0	5.0	8.0	9.0	9.0	9.0	4.1	3.7	7.0	9.0	10.0	10.0
GARRISON --------------													
ELEV FTMSL	1819.9	1822.4	1823.9	1825.2	1831.9	1836.3	1836.8	1836.4	1836.0	1835.2	1834.5	1832.8	1831.7
DISCH KCFS	21.0	11.0	17.0	19.0	21.5	21.5	21.5	18.2	15.1	19.0	20.0	24.0	22.0
OAHE ------------------													
ELEV FTMSL	1590.9	1595.0	1597.2	1598.0	1600.6	1601.0	1600.5	1599.6	1599.8	1600.4	1600.9	1601.6	1603.7
DISCH KCFS	15.1	8.3	15.3	19.6	16.9	20.7	23.5	23.7	14.7	15.0	16.1	20.1	13.4
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	8.3	15.3	19.6	16.9	20.6	23.3	23.4	14.4	14.7	15.9	20.1	13.4
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	20.8	19.3	21.9	20.8	21.7	23.7	27.4	25.4	16.9	10.9	11.7	8.9
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	24.8	24.0	24.4	25.4	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	44018	46388	47831	48944	52327	53988	53849	53573	53118	52717	52853	52996	53460
PEAK POWER MW		2216	2237	2250	2292	2312	2311	2308	2289	2218	2242	2269	2311
ENERGY GWH	7381	337	340	682	654	741	795	723	583	571	569	673	496

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                                        PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 9M
                                        Elevations & Storages are for Date Shown
                                        Discharge & Energy are Period Values
                                        Date:    07/16/92

                                          1992                                1993
                    31JUL92    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK -------------
        ELEV FTMSL   2212.3   2211.3   2211.1   2211.3   2211.5   2210.1   2208.7   2207.6
        DISCH KCFS      8.8      6.0      4.7      3.5      5.0      8.0      9.0      9.0

GARRISON --------------
        ELEV FTMSL   1823.6   1821.8   1821.2   1821.3   1820.9   1819.1   1817.6   1816.6
        DISCH KCFS     19.5     19.0     13.5     10.1     15.0     19.0     20.0     20.0

OAHE ------------------
        ELEV FTMSL   1588.0   1585.9   1585.0   1584.6   1585.5   1585.4   1586.6   1587.8
        DISCH KCFS     25.9     25.8     17.3     11.1      7.9     18.1     15.1     15.7

BIG BEND --------------
        ELEV FTMSL   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
        DISCH KCFS     25.9     25.5     16.8     10.8      7.6     17.9     15.1     15.7

FORT RANDALL ----------
        ELEV FTMSL   1355.2   1353.2   1344.5   1337.5   1337.5   1344.4   1347.8   1353.0
        DISCH KCFS     25.7     28.3     27.9     17.9      7.6     10.7     11.5      9.0

GAVINS POINT  ---------
        ELEV FTMSL   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
        DISCH KCFS     27.0     29.0     28.5     19.6      9.0     12.0     13.0     11.5

SYSTEM ----------------
     STORAGE 1000 AF  44581    43295    42278    41793    41940    41646    41594    41866
       PEAK POWER MW           2073     2045     2012     1977     2092     2106     2150
      ENERGY GWH       3559      770      580      400      278      339      527      465
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                                        PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 9M

                                          1993                                                                              1994
                    28FEB93    31MAR    30APR    31MAY    30JUN    31JUL    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB
FORT PECK -------------
        ELEV FTMSL   2207.6   2209.1   2210.6   2212.7   2217.2   2218.6   2218.0   2218.4   2219.1   2219.0   2217.8   2217.1   2216.6
        DISCH KCFS      9.0      4.0      5.0      8.0      8.5      8.5      8.5      4.7      3.5      9.0     10.0     10.0     10.0

GARRISON --------------
        ELEV FTMSL   1816.6   1818.8   1819.9   1821.1   1827.0   1829.1   1828.3   1828.2   1827.8   1827.5   1826.2   1824.4   1823.3
        DISCH KCFS     20.0     10.0     16.0     19.0     21.0     21.0     21.0     14.4     12.4     17.0     20.0     24.0     23.0

OAHE ------------------
        ELEV FTMSL   1587.8   1590.4   1592.1   1592.9   1596.1   1596.0   1594.7   1592.0   1591.1   1590.5   1591.4   1592.3   1594.8
        DISCH KCFS     15.7     15.7     14.4     20.8     19.4     22.4     24.6     24.5     15.0     15.7     14.9     19.4     12.9

BIG BEND --------------
        ELEV FTMSL   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
        DISCH KCFS     15.7     15.7     14.4     20.8     19.4     22.3     24.3     24.1     14.7     15.3     14.7     19.4     12.9

FORT RANDALL ----------
        ELEV FTMSL   1353.0   1355.2   1355.2   1355.2   1355.2   1355.2   1355.2   1353.5   1345.0   1337.5   1342.7   1349.8   1353.0
        DISCH KCFS      9.0     21.6     20.3     22.6     21.8     23.4     24.6     27.7     25.7     17.2     10.2     11.7      8.8

GAVINS POINT  ---------
        ELEV FTMSL   1206.0   1206.0   1206.0   1206.0   1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
        DISCH KCFS     11.5     22.8     22.8     24.8     24.0     24.4     25.4     28.5     27.5     19.8     12.0     13.0     11.5

SYSTEM ----------------
     STORAGE 1000 AF  41866    43433    44381    45235    48400    49203    48544    47753    46901    46175    46147    46274    46775
       PEAK POWER MW           2171     2187     2198     2243     2251     2242     2230     2205     2129     2151     2178     2222
      ENERGY GWH       7217      356      520      688      670      748      785      692      550      553      538      639      479
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                                        PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 9LQ & 9LD
                                        Elevations & Storages are for Date Shown
                                        Discharge & Energy are Period Values
                                        Date:    07/16/92

                                               1992                                1993
                          31JUL92    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK --------------
          ELEV FTMSL       2211.5   2210.4   2210.2   2210.2   2210.4   2208.7   2206.9   2205.6
          DISCH KCFS          8.8      6.0      4.5      3.5      5.0      8.0      9.0      8.8

GARRISON ---------------
          ELEV FTMSL       1822.4   1820.7   1819.9   1819.7   1819.4   1817.6   1816.1   1815.0
          DISCH KCFS         19.8     18.0     13.5     10.1     10.0     18.0     19.0     19.0

OAHE -------------------
          ELEV FTMSL       1587.5   1585.1   1584.2   1583.9   1584.4   1584.5   1584.9   1586.1
          DISCH KCFS         26.8     26.0     17.5     11.3      8.1     16.3     17.3     14.6

BIG BEND ---------------
          ELEV FTMSL       1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
          DISCH KCFS         26.8     25.8     17.1     11.0      7.9     16.3     17.3     14.6

FORT RANDALL -----------
          ELEV FTMSL       1355.2   1353.2   1344.6   1337.5   1337.5   1342.7   1347.8   1353.0
          DISCH KCFS         26.4     28.5     28.1     18.2      7.9     11.0     11.8      7.8

GAVINS POINT  ----------
          ELEV FTMSL       1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
          DISCH KCFS         27.0     29.0     28.5     19.6      9.0     12.0     13.0     10.0

SYSTEM -----------------
      STORAGE 1000 AF       44044    42709    41632    41044    41132    40733    40545    40740
         PEAK POWER MW               2065     2036     2002     1946     2072     2090     2132
        ENERGY GWH           3501      763      581      403      268      510      544      431
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                                        PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 9LQ

                                               1993                                                                            1994
                          28FEB93    31MAR    30APR    31MAY    30JUN    31JUL    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB
FORT PECK --------------
          ELEV FTMSL       2205.6   2207.1   2208.7   2212.7   2214.7   2213.8   2211.6   2211.1   2210.9   2210.0   2208.1   2206.5   2205.6
          DISCH KCFS          8.8      4.0      5.0      7.0      8.5      8.5      8.5      4.3      3.5      8.0      9.0     10.0     10.0
GARRISON ---------------
          ELEV FTMSL       1815.0   1816.9   1818.6   1818.6   1822.0   1823.3   1822.2   1821.3   1820.6   1819.0   1817.6   1815.4   1814.4
          DISCH KCFS         19.0     10.0     15.0     19.5     19.0     19.0     19.0     13.0     11.1     19.0     20.0     22.0     21.0
OAHE -------------------
          ELEV FTMSL       1586.1   1587.4   1588.0   1588.0   1589.9   1589.2   1587.5   1584.5   1582.6   1582.1   1582.5   1583.0   1585.5
          DISCH KCFS         14.6     18.6     17.1     21.5     19.2     22.1     24.3     24.6     16.1     16.9     15.8     19.3     11.5
BIG BEND ---------------
          ELEV FTMSL       1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
          DISCH KCFS         14.6     18.6     17.1     21.5     19.2     22.0     23.9     24.1     15.7     16.4     15.6     19.3     11.5
FORT RANDALL -----------
          ELEV FTMSL       1353.0   1355.2   1355.2   1355.2   1355.2   1355.2   1355.2   1353.5   1345.5   1337.5   1342.7   1349.8   1353.0
          DISCH KCFS          7.8     21.4     19.6     22.7     21.4     22.6     24.2     27.9     26.1     17.2     10.6     11.5      7.4
GAVINS POINT  ----------
          ELEV FTMSL       1206.0   1206.0   1206.0   1206.0   1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
          DISCH KCFS         10.0     22.8     22.8     24.8     24.0     24.4     25.4     28.5     27.5     19.8     12.0     13.0     10.0
SYSTEM -----------------
      STORAGE 1000 AF       40740    41924    42731    43400    45064    45077    44004    42849    41601    40436    40207    40063    40454
         PEAK POWER MW               2147     2158     2164     2189     2188     2174     2136     2126     2043     2062     2085     2127
        ENERGY GWH           6966      353      534      685      640      708      744      664      541      360      522      596      418
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                                        PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 9LD

                                               1993                                                                            1994
                          28FEB93    31MAR    30APR    31MAY    30JUN    31JUL    31AUG    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB
FORT PECK --------------
          ELEV FTMSL       2205.6   2207.1   2208.6   2209.9   2210.2   2208.6   2206.5   2206.0   2205.8   2204.6   2203.0   2201.5   2201.2
          DISCH KCFS          8.8      4.0      5.0      6.0      8.0      8.0      7.5      3.8      3.1      8.0      8.0      9.0      8.0
GARRISON ---------------
          ELEV FTMSL       1815.1   1815.6   1817.3   1817.0   1820.4   1821.6   1820.3   1819.5   1818.8   1817.0   1815.1   1812.4   1810.5
          DISCH KCFS         19.0     10.0     15.0     21.0     19.5     19.5     19.5     12.4     10.5     19.0     20.0     23.0     22.0
OAHE -------------------
          ELEV FTMSL       1586.1   1588.0   1587.2   1587.0   1587.1   1586.2   1584.1   1580.0   1577.4   1577.2   1577.7   1578.5   1581.2
          DISCH KCFS         14.6     18.5     18.9     22.5     20.8     23.6     25.4     27.1     18.3     16.5     16.9     20.5     11.8
BIG BEND ---------------
          ELEV FTMSL       1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
          DISCH KCFS         14.6     18.5     18.9     22.5     20.8     23.5     25.0     26.6     17.8     16.1     16.7     20.5     11.8
FORT RANDALL -----------
          ELEV FTMSL       1353.0   1355.2   1355.2   1355.2   1355.2   1355.2   1355.2   1353.5   1346.6   1337.5   1342.7   1349.8   1353.0
          DISCH KCFS          7.8     21.4     20.4     22.8     21.8     23.3     24.7     27.9     25.9     17.4     10.5     11.6      7.4
GAVINS POINT  ----------
          ELEV FTMSL       1206.0   1206.0   1206.0   1206.0   1206.0   1206.0   1206.5   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
          DISCH KCFS         10.0     22.8     22.8     24.8     24.0     24.4     25.4     28.5     27.5     19.8     12.0     13.0     10.0
SYSTEM -----------------
      STORAGE 1000 AF       40741    41754    42224    42309    43227    43036    41875    40548    39271    38029    37746    37564    37911
         PEAK POWER MW               2145     2149     2149     2163     2160     2143     2120     2092     2004     2021     2044     2086
        ENERGY GWH           7021      363      560      697      656      725      747      675      551      530      517      599      404
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PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 10UD & 10UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK --------------								
ELEV FTMSL	2212.9	2212.1	2212.3	2213.0	2213.6	2212.5	2211.6	2211.3
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	9.0	9.5	9.0
GARRISON ---------------								
ELEV FTMSL	1824.8	1823.3	1822.9	1823.3	1823.2	1822.0	1820.7	1819.9
DISCH KCFS	19.5	19.5	14.0	10.3	17.0	19.0	21.5	21.0
OAHE -------------------								
ELEV FTMSL	1588.4	1586.7	1586.6	1586.2	1587.6	1588.2	1589.3	1590.9
DISCH KCFS	24.9	25.0	15.5	12.0	7.3	15.9	16.7	15.1
BIG BEND ---------------								
ELEV FTMSL	1420.5	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.0	24.8	15.6	11.1	7.1	15.7	16.7	15.1
FORT RANDALL -----------								
ELEV FTMSL	1355.2	1353.2	1344.0	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	25.0	27.8	27.6	17.8	7.2	10.4	11.3	8.6
GAVINS POINT ----------								
ELEV FTMSL	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM -----------------								
STORAGE 1000 AF	45108	44000	43202	42995	43386	43332	43486	44018
PEAK POWER MW		2081	2056	2028	1997	2112	2135	2182
ENERGY GWH	3582	764	564	412	279	523	569	471

PRELIMINARY 1992-1993 AOP UPPER DECILE INFLOW - OPTION 10UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK --------------													
ELEV FTMSL	2211.3	2213.8	2216.6	2220.3	2227.3	2231.8	2232.3	2233.6	2234.8	2234.9	2234.4	2233.6	2234.0
DISCH KCFS	9.0	4.5	5.0	7.0	8.0	8.0	8.0	3.2	3.2	8.0	8.5	10.0	9.0
GARRISON ---------------													
ELEV FTMSL	1819.9	1822.5	1827.2	1829.7	1837.4	1842.3	1842.3	1841.6	1840.8	1840.2	1839.3	1838.2	1837.5
DISCH KCFS	21.0	12.0	18.0	19.0	21.0	21.0	21.0	17.1	15.0	20.0	20.0	24.0	23.0
OAHE -------------------													
ELEV FTMSL	1590.9	1594.5	1598.5	1599.3	1601.5	1602.6	1602.3	1601.8	1602.2	1603.0	1604.4	1605.4	1607.5
DISCH KCFS	15.1	16.3	17.1	20.9	16.6	18.5	21.7	24.5	16.2	16.5	15.8	18.5	12.1
BIG BEND ---------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	16.3	17.1	20.9	16.6	18.4	21.5	24.1	15.9	16.2	15.6	18.5	12.1
FORT RANDALL -----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	21.0	20.0	22.7	19.5	18.8	21.8	27.2	26.1	17.2	10.7	11.4	9.1
GAVINS POINT ----------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	24.8	24.0	21.0	23.0	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM -----------------													
STORAGE 1000 AF	44018	46180	48972	50581	54707	57490	57522	57276	56728	56322	56655	56941	57721
PEAK POWER MW		2213	2255	2273	2320	2346	2347	2344	2324	2254	2281	2312	2356
ENERGY GWH	7373	370	576	699	638	681	750	721	608	606	568	663	492

PRELIMINARY 1992-1993 AOP UPPER QUARTILE INFLOW - OPTION 10UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK --------------													
ELEV FTMSL	2211.3	2214.5	2217.1	2220.1	2224.8	2226.4	2225.8	2226.8	2228.0	2228.6	2228.0	2227.7	2227.4
DISCH KCFS	9.0	4.0	5.0	8.0	8.5	8.5	8.5	4.5	4.1	7.0	9.0	10.0	10.0
GARRISON ---------------													
ELEV FTMSL	1819.9	1822.4	1823.9	1825.2	1831.9	1836.3	1836.8	1836.6	1836.3	1835.7	1835.0	1833.3	1832.3
DISCH KCFS	21.0	11.0	17.0	19.0	21.0	21.0	21.0	17.5	14.6	19.0	20.0	24.0	22.0
OAHE -------------------													
ELEV FTMSL	1590.9	1595.0	1597.2	1598.0	1600.5	1601.6	1601.4	1600.4	1600.5	1601.0	1601.5	1602.2	1604.2
DISCH KCFS	15.1	8.3	15.3	19.6	16.9	17.2	21.1	23.8	14.7	15.0	16.1	20.1	13.4
BIG BEND ---------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	8.3	15.3	19.6	16.9	17.1	20.9	23.5	14.4	14.7	15.9	20.1	13.4
FORT RANDALL -----------													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	20.8	19.3	21.9	20.6	18.2	21.3	27.5	25.4	16.9	10.9	11.7	8.9
GAVINS POINT ----------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	24.8	24.0	21.0	23.0	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM -----------------													
STORAGE 1000 AF	44018	46388	47831	48944	52334	54211	54216	53926	53469	53069	53204	53347	53811
PEAK POWER MW		2216	2237	2250	2292	2315	2317	2313	2294	2223	2246	2274	2315
ENERGY GWH	7232	357	540	682	645	658	735	724	583	568	569	674	497

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 10M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2210.1	2208.7	2207.8
DISCH KCFS	8.8	6.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON --------------								
ELEV FTMSL	1823.6	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1818.6
DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE ------------------								
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND --------------								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ----------------								
STORAGE 1000 AF	44581	43295	42278	41793	41940	41666	41594	41866
PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
ENERGY GWH	3539	770	580	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 10M

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2207.6	2209.1	2210.6	2212.9	2217.5	2219.1	2218.7	2218.9	2219.4	2219.3	2218.5	2217.7	2217.2
DISCH KCFS	9.0	4.0	5.0	7.5	8.0	8.0	8.0	5.3	4.0	9.0	9.0	10.0	10.0
GARRISON --------------													
ELEV FTMSL	1816.6	1818.8	1819.9	1821.2	1827.1	1829.2	1828.4	1828.5	1828.4	1828.2	1826.7	1824.9	1823.8
DISCH KCFS	20.0	10.0	16.0	18.0	20.5	20.5	20.5	13.7	11.8	17.0	20.0	24.0	23.0
OAHE ------------------													
ELEV FTMSL	1587.8	1590.4	1592.1	1592.7	1595.8	1596.4	1595.5	1592.7	1591.6	1591.0	1591.8	1592.7	1595.2
DISCH KCFS	15.7	15.7	14.4	20.8	19.4	18.9	22.3	24.6	15.0	15.7	14.9	19.4	12.9
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	15.7	14.4	20.8	19.4	18.8	21.9	24.2	14.7	15.3	14.7	19.4	12.9
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	9.0	21.6	20.3	22.6	21.8	19.9	22.2	27.8	25.7	17.2	10.2	11.7	8.8
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	22.8	22.8	24.8	24.0	21.0	23.0	28.5	27.5	19.8	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	41866	43433	44381	45245	48407	49426	48912	48104	47252	46526	46508	46625	47126
PEAK POWER MW		2171	2187	2198	2242	2254	2248	2235	2210	2134	2156	2183	2227
ENERGY GWH	7053	356	520	676	661	666	727	694	550	554	530	641	480

PRELIMINARY 1992-1993 AOP 90 PERCENT FORECAST - OPTIONS 10LQ & 10LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2211.5	2210.4	2210.2	2210.2	2210.4	2208.7	2206.9	2205.6
DISCH KCFS	8.0	6.0	4.5	3.5	5.0	8.0	9.0	8.8
GARRISON --------------								
ELEV FTMSL	1822.4	1820.7	1819.9	1819.7	1819.4	1817.6	1816.1	1815.0
DISCH KCFS	19.0	18.0	13.5	10.1	10.0	18.0	19.0	19.0
OAHE ------------------								
ELEV FTMSL	1587.5	1585.1	1584.2	1583.9	1584.4	1584.5	1584.9	1586.1
DISCH KCFS	26.8	26.0	17.5	11.3	8.1	16.5	17.3	14.6
BIG BEND --------------								
ELEV FTMSL	1420.3	1420.5	1420.3	1420.5	1420.5	1420.5	1420.3	1420.5
DISCH KCFS	26.8	25.8	17.1	11.0	7.9	16.3	17.3	14.6
FORT RANDALL ----------								
ELEV FTMSL	1355.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	26.4	28.5	28.1	18.2	7.9	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------								
STORAGE 1000 AF	44044	42709	41632	41044	41132	40733	40343	40740
PEAK POWER MW		2065	2036	2002	1966	2072	2090	2132
ENERGY GWH	3501	763	581	403	268	510	344	431

PRELIMINARY 1992-1993 AOP LOWER QUARTILE INFLOW - OPTION 10LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.1	2208.7	2213.0	2215.2	2214.5	2212.5	2212.0	2211.8	2210.9	2208.8	2207.2	2206.4
DISCH KCFS	8.8	4.0	5.0	6.0	8.0	8.0	8.0	4.4	3.5	8.0	9.5	10.0	10.0
GARRISON --------------													
ELEV FTMSL	1815.0	1816.9	1818.6	1818.3	1821.8	1823.0	1821.8	1821.0	1820.5	1818.9	1817.6	1815.8	1814.9
DISCH KCFS	19.0	10.0	15.0	19.0	19.0	19.0	18.5	12.5	10.6	19.0	20.0	21.0	20.0
OAHE ------------------													
ELEV FTMSL	1586.1	1587.4	1588.0	1587.9	1589.8	1590.0	1588.8	1585.6	1583.6	1583.2	1583.5	1583.8	1586.0
DISCH KCFS	14.6	18.6	17.1	21.5	19.2	18.6	21.9	24.7	16.1	16.9	15.8	19.3	11.5
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.3	1420.3	1420.3	1420.3	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	18.6	17.1	21.5	19.2	18.5	21.3	24.2	15.7	16.4	15.6	19.3	11.5
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1353.2	1353.2	1353.5	1345.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	21.4	19.6	22.7	21.4	19.1	21.9	28.0	26.1	17.2	10.6	11.5	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.3	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	22.8	22.8	24.8	24.0	21.0	23.0	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40740	41924	42731	43413	45070	45298	44372	43204	41955	40786	40551	40417	40808
PEAK POWER MW		·2147	2158	2163	2188	2192	2180	2163	2132	2049	2068	2091	2132
ENERGY GWH	6805	353	534	672	635	631	687	663	539	561	528	590	412

PRELIMINARY 1992-1993 AOP LOWER DECILE INFLOW - OPTION 10LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2205.6	2207.1	2208.6	2210.1	2210.6	2209.2	2207.3	2206.7	2206.5	2205.4	2203.8	2202.3	2202.0
DISCH KCFS	8.8	4.0	5.0	5.5	7.5	7.5	7.0	3.8	3.1	8.0	8.0	9.0	8.0
GARRISON --------------													
ELEV FTMSL	1815.1	1815.6	1817.4	1817.0	1820.5	1821.9	1820.6	1819.8	1819.2	1817.5	1815.6	1812.9	1811.0
DISCH KCFS	19.0	10.0	14.5	21.0	18.5	18.5	18.5	12.5	10.1	19.0	20.0	23.0	22.0
OAHE ------------------													
ELEV FTMSL	1586.1	1588.0	1587.1	1586.8	1586.8	1586.5	1584.7	1580.6	1578.0	1577.8	1578.2	1579.0	1581.8
DISCH KCFS	14.6	18.5	18.9	22.5	20.8	20.1	23.0	27.2	18.3	16.5	16.9	20.5	11.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	18.5	18.9	22.5	20.8	19.9	22.6	26.6	17.8	16.1	16.7	20.5	11.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	·1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1346.6	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	21.4	20.4	22.8	21.8	19.8	22.3	28.0	25.9	17.4	10.5	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	22.8	22.8	24.8	24.0	21.0	23.0	28.5	27.5	19.8	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	40741	41754	42228	42314	43237	43281	42245	40900	39624	38377	38094	37912	38258
PEAK POWER MW		2143	2149	2149	2162	2163	2148	2126	2097	2010	2027	2050	2091
ENERGY GWH	6862	363	556	692	644	638	687	678	549	531	519	600	405

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 11M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 07/16/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.3	2211.3	2211.1	2211.3	2211.5	2210.1	2208.7	2207.6
DISCH KCFS	8.0	6.0	4.7	3.5	5.0	8.0	9.0	9.0
GARRISON								
ELEV FTMSL	1823.0	1821.8	1821.2	1821.3	1820.9	1819.1	1817.6	1816.6
DISCH KCFS	19.5	19.0	13.5	10.1	15.0	19.0	20.0	20.0
OAHE								
ELEV FTMSL	1588.0	1585.9	1585.0	1584.6	1585.5	1585.4	1586.6	1587.8
DISCH KCFS	25.9	25.8	17.3	11.1	7.9	18.1	15.1	15.7
BIG BEND								
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	25.9	25.5	16.8	10.8	7.6	17.9	15.1	15.7
FORT RANDALL								
ELEV FTMSL	1355.2	1353.2	1344.5	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	25.7	28.3	27.9	17.9	7.6	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	27.0	29.0	28.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	44581	43295	42278	41793	41940	41666	41594	41866
PEAK POWER MW		2073	2045	2012	1977	2092	2106	2150
ENERGY GWH	3559	770	580	400	278	539	527	465

PRELIMINARY 1992-1993 AOP MEDIAN INFLOW - OPTION 11M

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2207.6	2209.1	2210.6	2212.3	2216.2	2216.9	2215.6	2214.8	2214.7	2214.6	2213.4	2211.7	2210.6
DISCH KCFS	9.0	4.0	5.0	9.0	10.5	10.5	10.5	8.1	6.0	9.0	10.0	12.5	11.5
GARRISON													
ELEV FTMSL	1816.6	1818.0	1818.9	1819.2	1824.8	1826.5	1825.2	1824.4	1823.3	1822.6	1821.2	1819.4	1818.6
DISCH KCFS	20.0	14.0	17.0	23.5	25.0	25.0	25.0	20.7	17.8	18.0	20.0	25.0	24.0
OAHE													
ELEV FTMSL	1587.8	1590.3	1590.9	1591.1	1593.7	1592.4	1589.9	1587.1	1586.0	1584.8	1585.7	1587.0	1589.8
DISCH KCFS	15.7	21.8	20.4	27.4	26.8	31.3	33.4	30.4	20.9	18.2	14.9	19.4	12.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	21.8	20.4	27.4	26.8	31.2	33.1	30.0	20.6	17.9	14.7	19.4	12.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1344.9	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	9.0	27.7	26.3	29.2	29.2	32.2	33.4	33.6	31.8	19.8	10.2	11.7	8.8
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	28.8	28.8	31.4	31.4	33.2	34.2	34.5	33.5	22.8	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	41866	43233	43839	44259	46973	47234	46043	44889	43693	42722	42705	42799	43311
PEAK POWER MW		2169	2177	2182	2221	2221	2202	2186	2156	2076	2098	2126	2171
ENERGY GWH	8720	440	646	865	862	974	1005	877	728	652	527	656	487

Preliminary 1992-1993 AOP Regulation Studies

Service Levels, Navigation Season Length and Winter Release
(Storage in MAF, Release in 1,000 cfs, Navigation Season Length in months)

	March 15, 1993			July 1, 1993					September 1, 1993			
		Service Level			Service Level					Fort Randall Dec-Feb Release		
		> Min Service			> Min Service		Season Length				Master Manual	
Option	Storage	Study	MM	Storage	Study	MM	Study	MM	Storage	Study	Table 10	> Table
1UD	45.2	0.0	0.0	54.5	2.8	2.8	8	8	56.2	13.8	13.8	0.0
1UQ	45.3	0.0	0.0	52.2	1.2	1.2	8	8	53.2	11.8	11.8	0.0
1M	42.8	0.0	0.0	48.3	0.0	0.0	8	8	48.1	10.3	8.4	1.9
1LQ	41.5	0.0	0.0	44.9	0.0	0.0	8	8	43.5	9.9	5.4	4.5
1LD	41.4	0.0	0.0	43.1	0.0	0.0	8	8	41.4	9.9	5.0	4.9
2UD	46.7	0.5	0.5	55.8	3.8	3.8	8	8	57.5	4.2	14.6	-10.4
2UQ	46.8	0.5	0.5	53.5	2.1	2.1	8	8	54.4	4.3	12.6	-8.3
2M	44.3	0.0	0.0	49.7	0.0	0.0	8	8	49.5	4.1	9.3	-5.2
2LQ	42.9	0.0	0.0	46.3	0.0	0.0	8	8	44.9	4.1	6.3	-2.2
2LD	42.7	0.0	0.0	44.4	0.0	0.0	8	8	42.7	4.2	5.0	-0.8
3M	42.8	0.0	0.0	49.5	0.0	0.0	6.50	8	49.2	10.3	9.2	1.1
3LD	41.4	0.0	0.0	44.4	0.0	0.0	6.50	8	42.6	9.9	5.0	4.9
4M	42.8	0.0	0.0	48.3	0.0	0.0	7.50	8	48.1	10.4	8.4	2.0
4LQ	41.5	0.0	0.0	44.9	0.0	0.0	7.00	8	43.5	10.0	5.4	4.6
4LD	41.4	0.0	0.0	43.1	0.0	0.0	6.75	8	41.4	10.0	5.0	5.0
5UD	45.3	0.0	0.0	55.1	0.0	3.3	7.25	8	57.2	10.4	14.5	-4.1
5UQ	45.4	0.0	0.0	52.8	0.0	1.6	7.25	8	53.9	10.6	12.3	-1.7
5M	42.8	0.0	0.0	48.8	0.0	0.0	6.75	8	48.6	10.4	8.8	1.6
5LQ	41.5	0.0	0.0	45.5	0.0	0.0	6.25	8	44.1	10.0	5.7	4.3
5LD	41.5	0.0	0.0	43.7	0.0	0.0	6.00	8	42.0	10.0	5.0	5.0
6UD	45.3	0.0	0.0	55.5	0.0	3.6	6.75	8	57.6	10.4	14.8	-4.4
6UQ	45.4	0.0	0.0	53.2	0.0	1.9	6.75	8	54.3	10.6	12.6	-2.0
6M	42.8	0.0	0.0	49.2	0.0	0.0	6.75	8	49.0	10.3	9.0	1.3
6LQ	41.5	0.0	0.0	45.9	0.0	0.0	6.75	8	44.5	9.9	6.0	3.9
6LD	41.4	0.0	0.0	44.1	0.0	0.0	6.75	8	42.4	9.9	5.0	4.9
7M	42.8	-	0.0	49.5	-	0.0	-	8	49.8	10.4	9.5	0.9
7LD	41.5	-	0.0	44.4	-	0.0	-	8	43.1	10.0	5.1	4.9
8M	42.8	-	0.0	50.1	-	0.0	-	8	50.8	10.4	10.2	0.2
8LD	41.5	-	0.0	44.9	-	0.0	-	8	44.1	10.0	5.8	4.2

Preliminary 1992-1993 AOP Regulation Studies

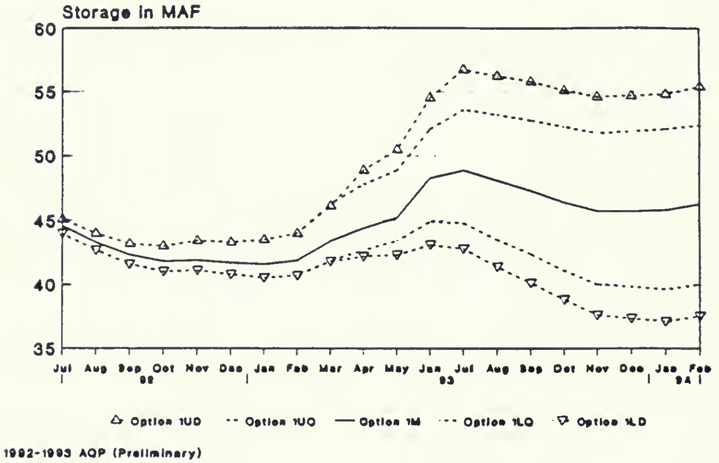
Service Levels, Navigation Season Length and Winter Release

(Storage in MAF, Release in 1,000 cfs, Navigation Season Length in months)

	March 15, 1993			July 1, 1993					September 1, 1993			
		Service Level			Service Level					Fort Randall Dec-Feb Release		
		> Min Service			> Min Service		Season Length				Master Manual	
Option	Storage	Study	MM	Storage	Study	MM	Study	MM	Storage	Study	Table 10	> Table 10
9UD	45.3	0.0	0.0	54.7	0.0	3.0	6.50	8	57.2	10.4	14.4	-4.0
9UQ	45.4	0.0	0.0	52.3	0.0	1.3	6.50	8	53.8	10.6	12.2	-1.6
9M	42.8	0.0	0.0	48.4	0.0	0.0	6.50	8	48.5	10.3	8.7	1.6
9LQ	41.5	0.0	0.0	45.1	0.0	0.0	6.50	8	44.0	9.9	5.7	4.2
9LD	41.4	0.0	0.0	43.2	0.0	0.0	6.50	8	41.9	9.9	5.0	4.9
10UD	45.3	0.0	0.0	54.7	0.0	3.0	6.50	8	57.5	10.4	14.7	-4.3
10UQ	45.4	0.0	0.0	52.3	0.0	1.3	6.50	8	54.2	10.6	12.5	-1.9
10M	42.8	0.0	0.0	48.4	0.0	0.0	6.50	8	48.9	10.3	8.9	1.4
10LQ	41.5	0.0	0.0	45.1	0.0	0.0	6.50	8	44.4	9.9	5.9	4.0
10LD	41.4	0.0	0.0	43.2	0.0	0.0	6.50	8	42.2	9.9	5.0	4.9
11M	42.8	6.0	0.0	47.0	6.0	0.0	8	8	46.0	10.3	7.0	3.3

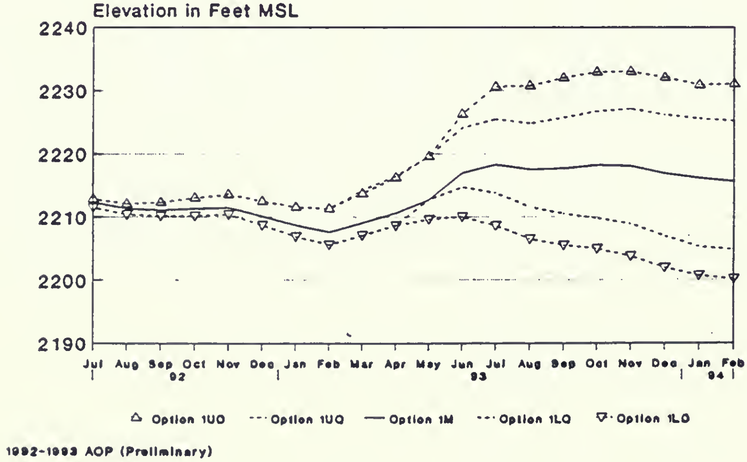
Missouri River Main Stem System Storage

Option 1

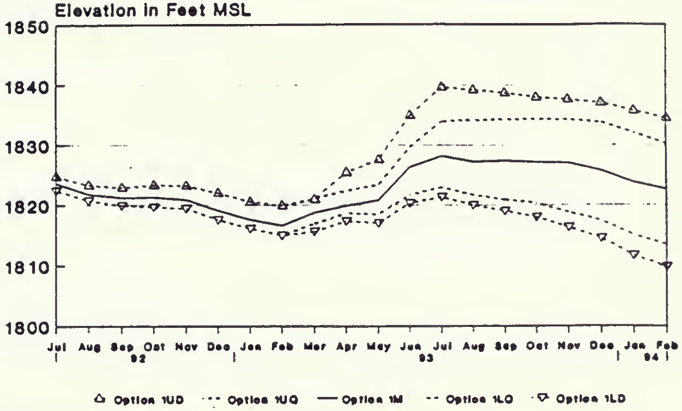


Fort Peck Pool Elevations

Option 1

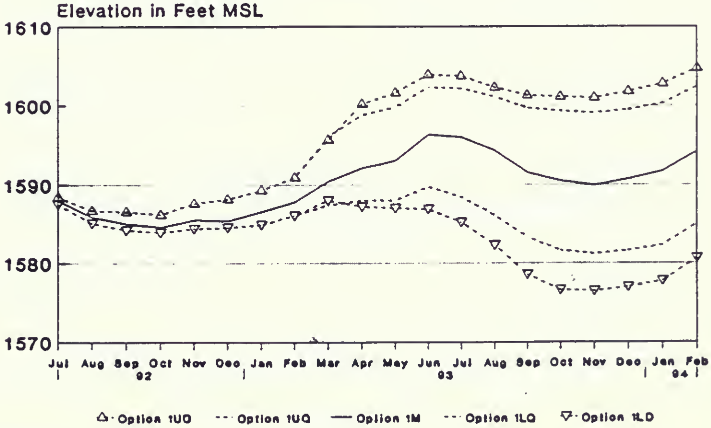


Garrison Pool Elevations
Option 1



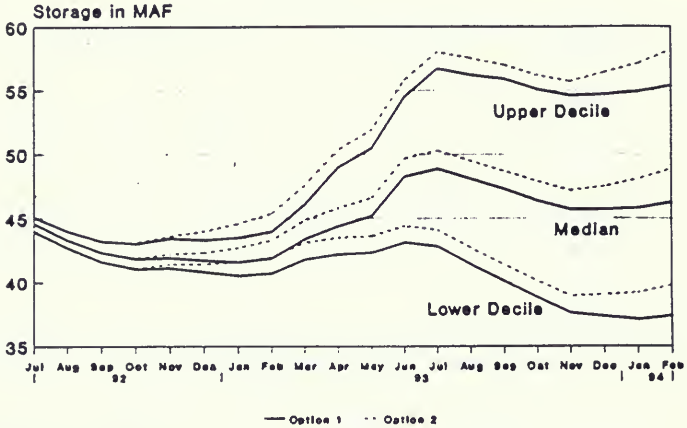
1992-1993 AOP (Preliminary)

Oahe Pool Elevations
Option 1



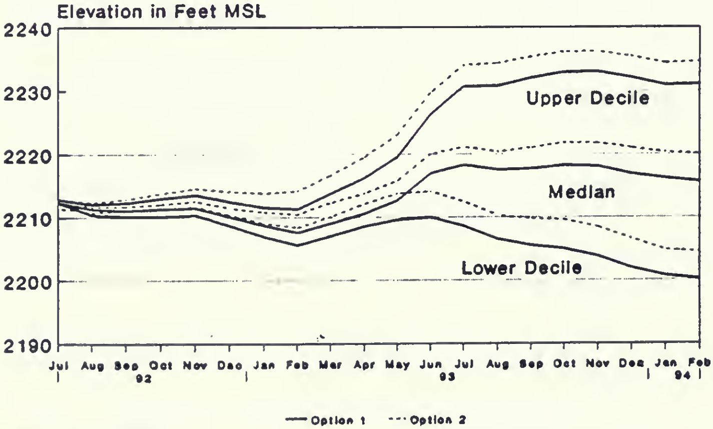
1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage
Options 1 & 2



1992-1993 AOP (Preliminary)

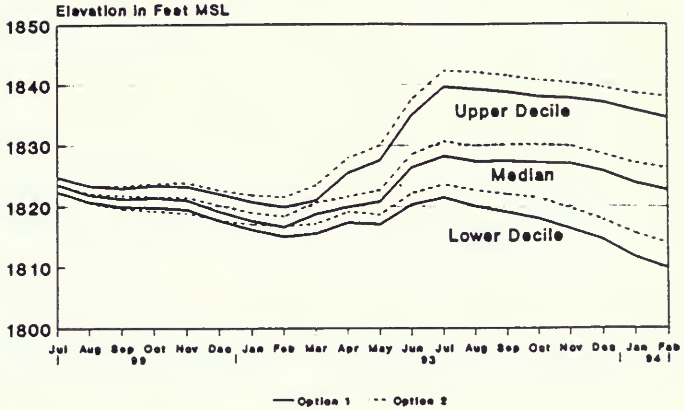
Fort Peck Pool Elevations
Options 1 & 2



1992-1993 AOP (Preliminary)

Garrison Pool Elevations

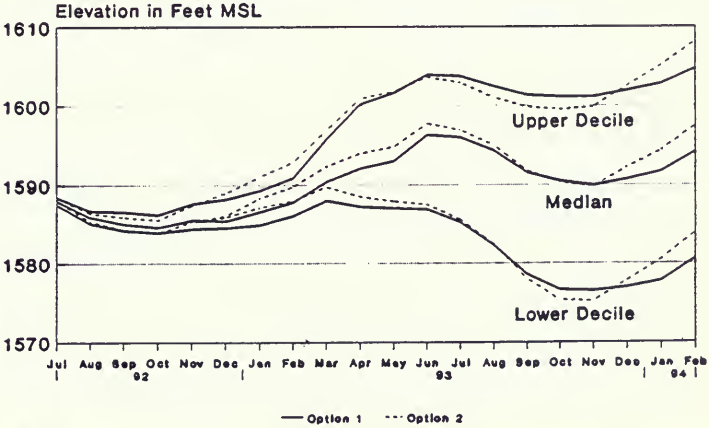
Options 1 & 2



1992-1993 AOP (Preliminary)

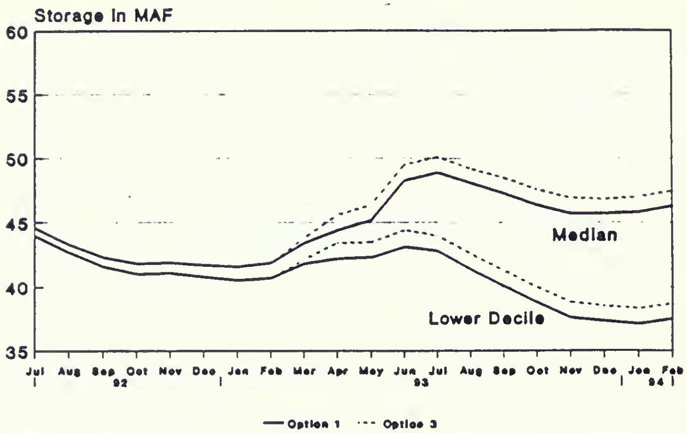
Oahe Pool Elevations

Options 1 & 2



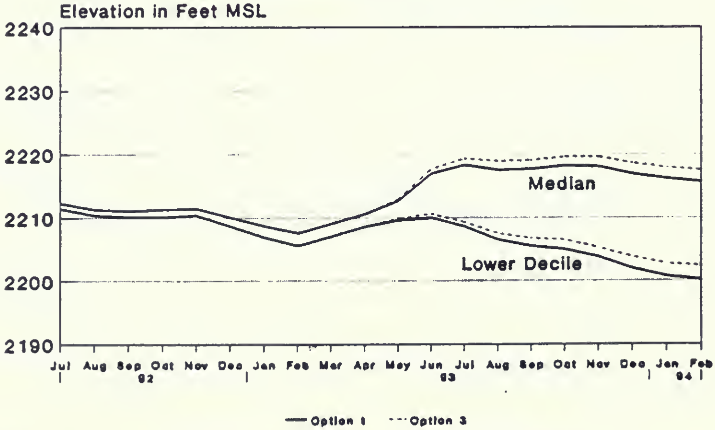
1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage
Options 1 & 3



1992-1993 AOP (Preliminary)

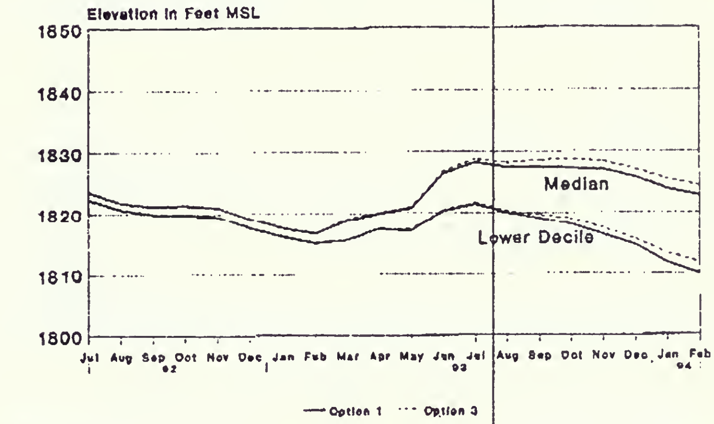
Fort Peck Pool Elevations
Options 1 & 3



1992-1993 AOP (Preliminary)

Garrison Pool Elevations

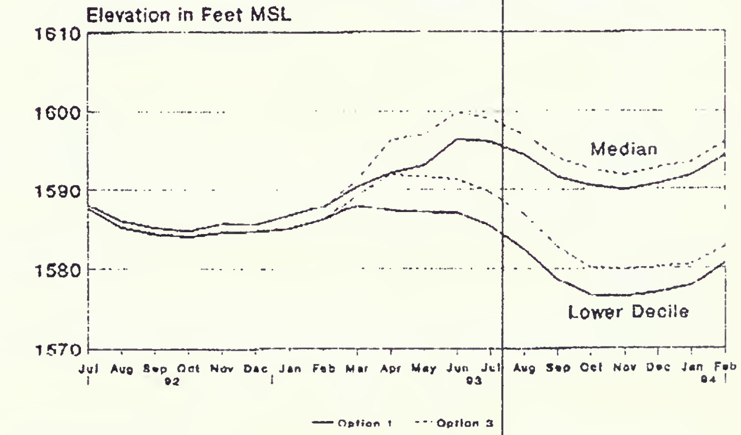
Options 1 & 3



1992-1993 AOP (Preliminary)

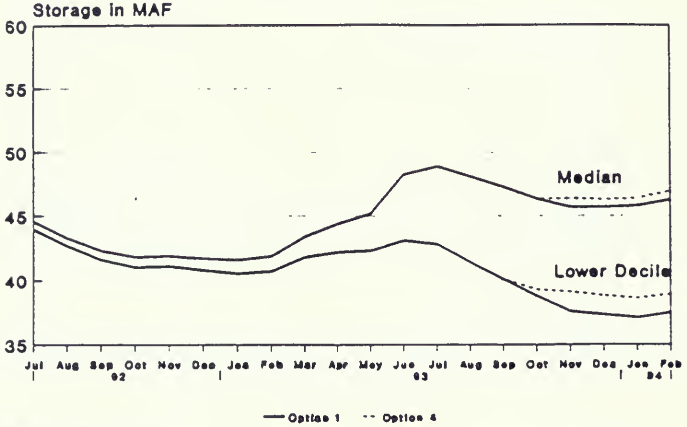
Oahe Pool Elevations

Options 1 & 3



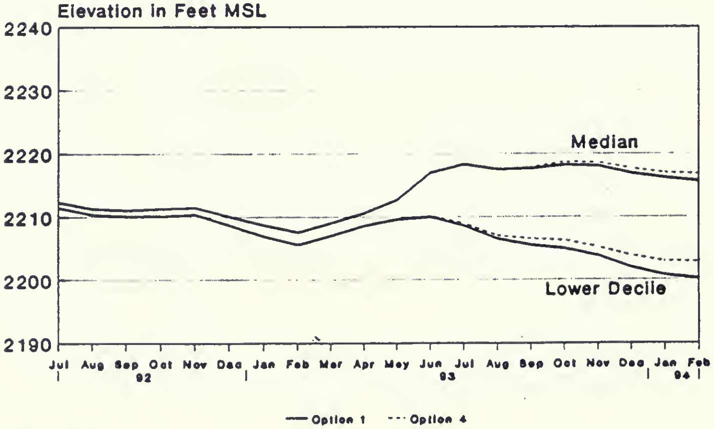
1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage
Option 1 and 4



1992-1993 AOP (Preliminary)

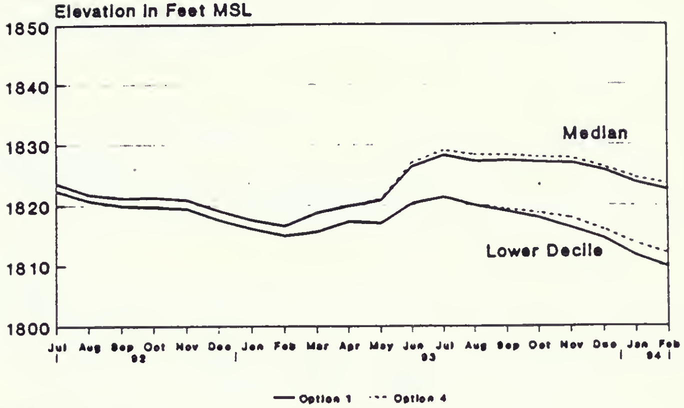
Fort Peck Pool Elevations
Options 1 and 4



1992-1993 AOP (Preliminary)

Garrison Pool Elevations

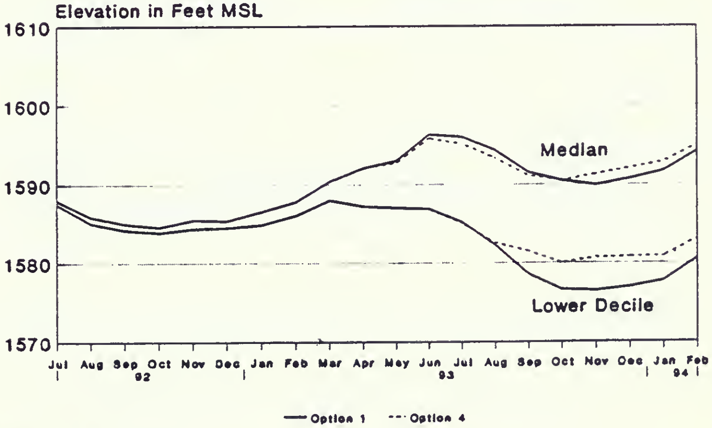
Options 1 and 4



1992-1993 AOP (Preliminary)

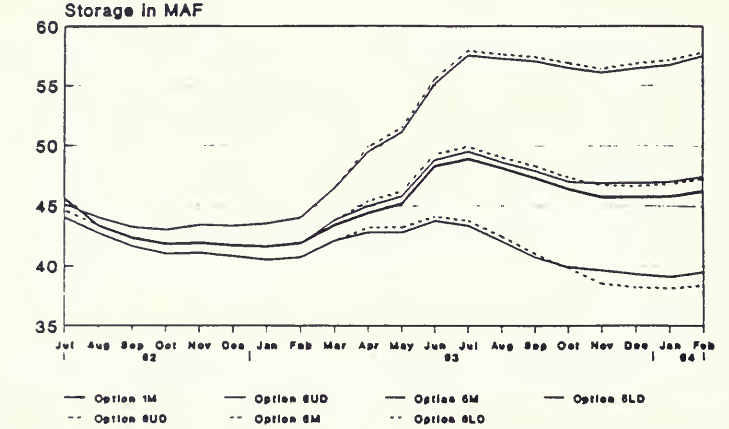
Oahe Pool Elevations

Options 1 and 4



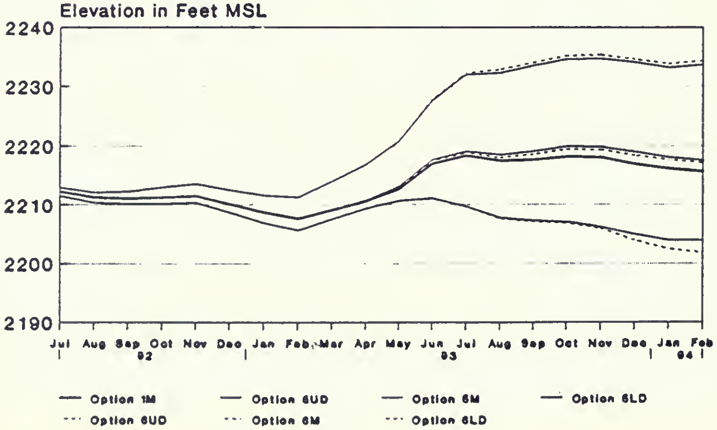
1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage
Options 5, 6, and 1M



1992-1993 AOP (Preliminary)

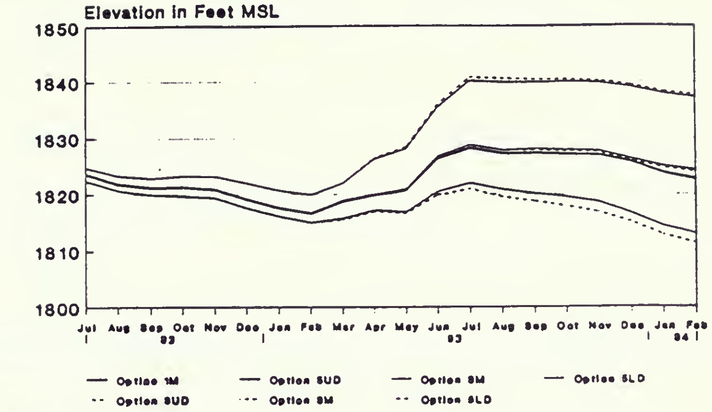
Fort Peck Pool Elevations
Option 5, 6, and 1M



1992-1993 AOP (Preliminary)

Garrison Pool Elevations

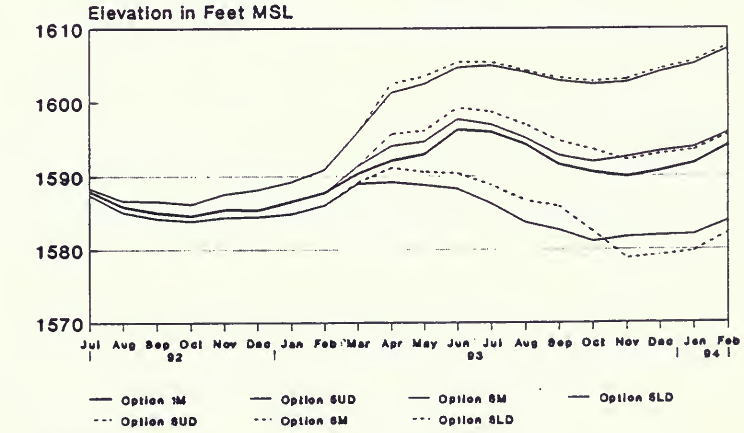
Options 5, 6, and 1M



1992-1993 AOP (Preliminary)

Oahe Pool Elevations

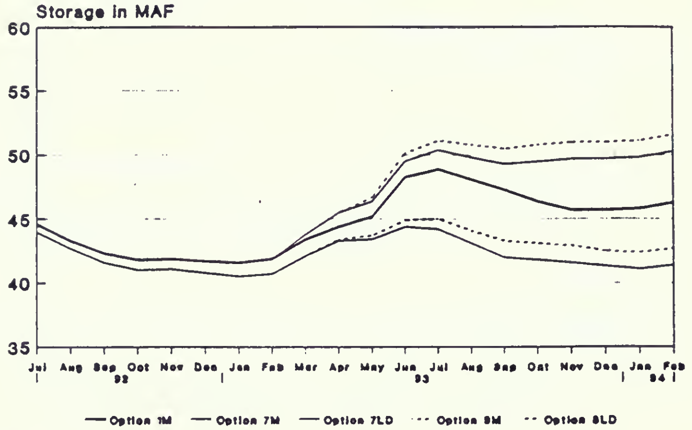
Options 5, 6, and 1M



1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage

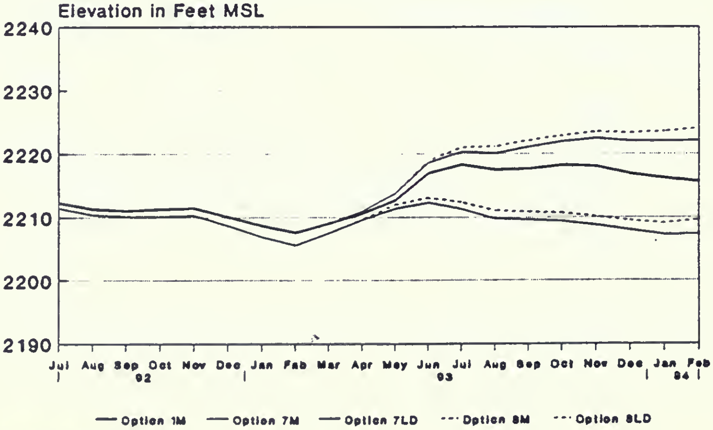
Option 7, 8, and 1M



1992-1993 AOP (Preliminary)

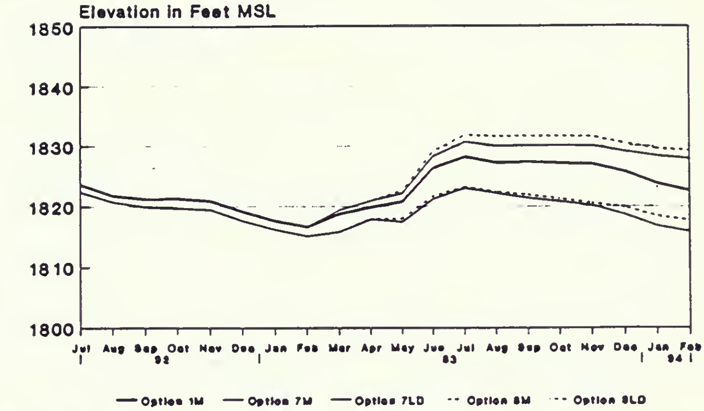
Fort Peck Pool Elevations

Option 7, 8, and 1M



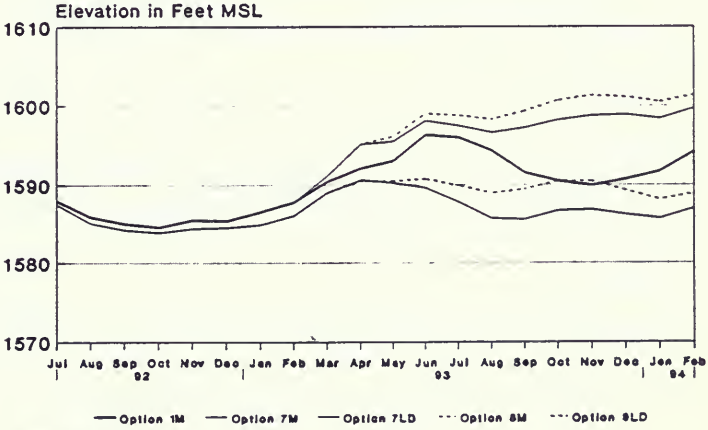
1992-1993 AOP (Preliminary)

Garrison Pool Elevations
Option 7, 8, and 1M



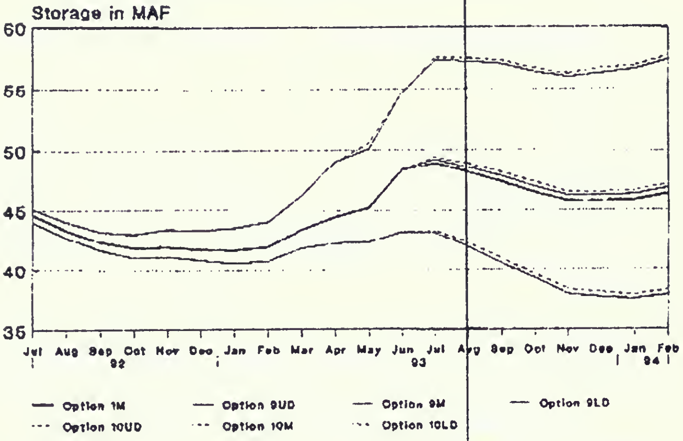
1992-1993 AOP (Preliminary)

Oahe Pool Elevations
Option 7, 8, and 1M



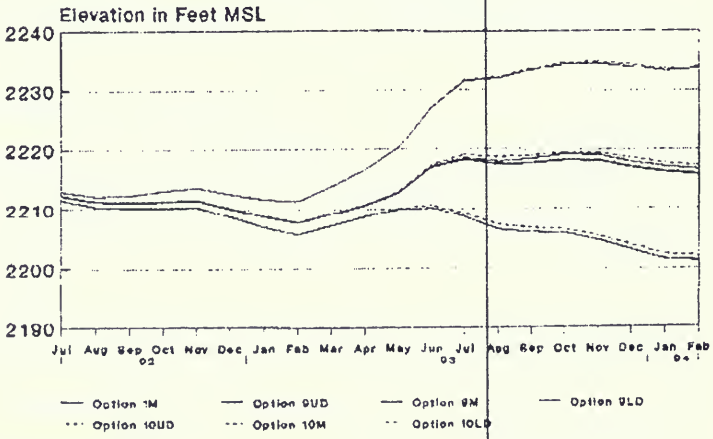
1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage
Options 9, 10, and 1M



1992-1993 AOP (Preliminary)

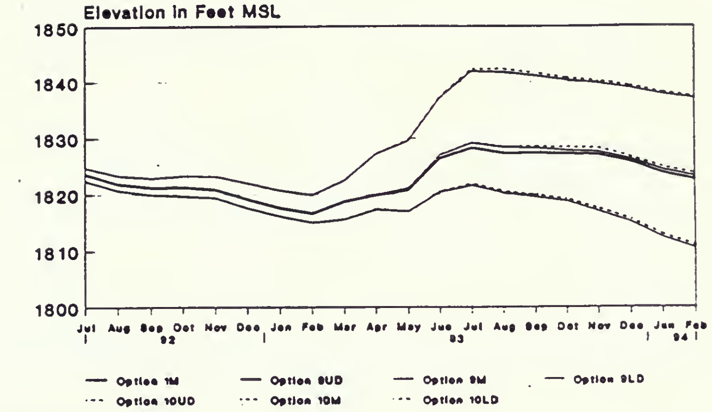
Fort Peck Pool Elevations
Option 9, 10, and 1M



1992-1993 AOP (Preliminary)

Garrison Pool Elevations

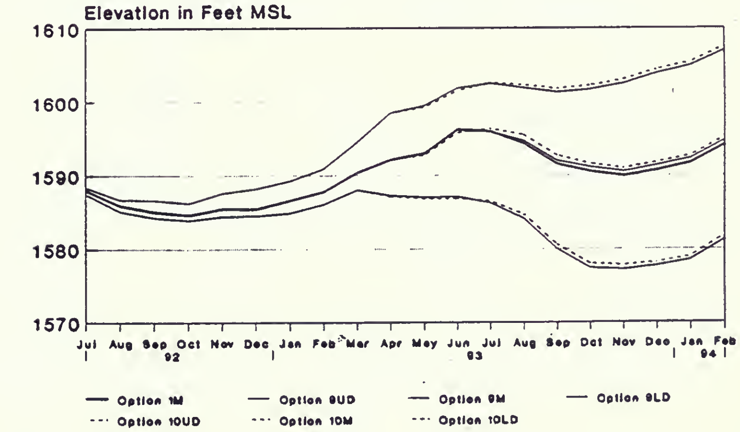
Options 9, 10, and 1M



1992-1993 AOP (Preliminary)

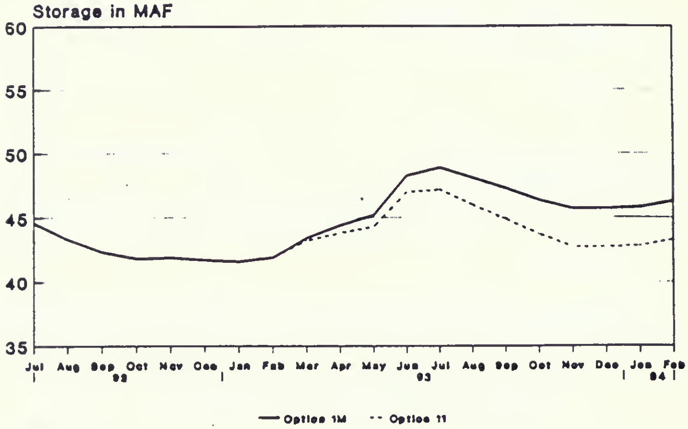
Oahe Pool Elevations

Options 9, 10, and 1M



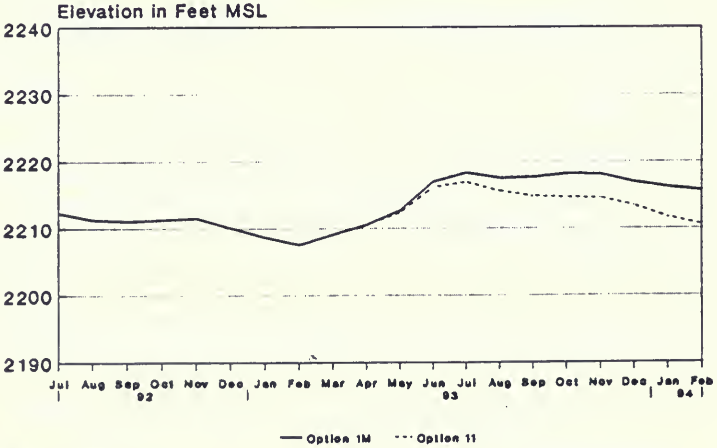
1992-1993 AOP (Preliminary)

Missouri River Main Stem System Storage
Option 11



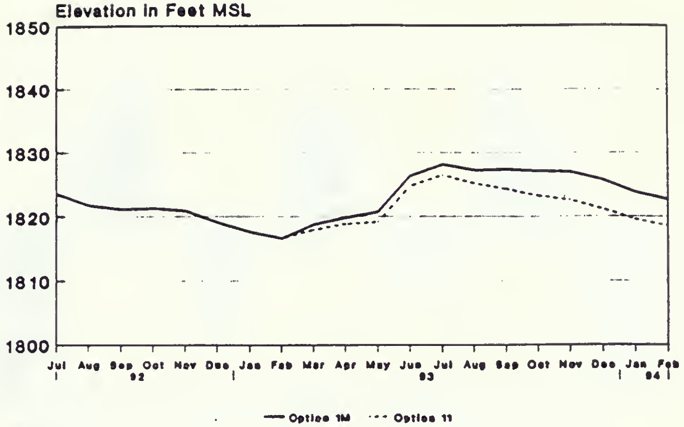
1992-1993 AOP (Preliminary)

Fort Peck Pool Elevations
Option 11



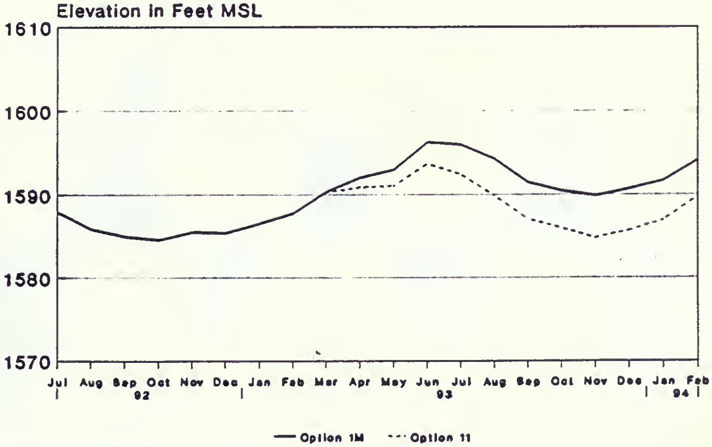
1992-1993 AOP (Preliminary)

Garrison Pool Elevations
Option 11



1992-1993 AOP (Preliminary)

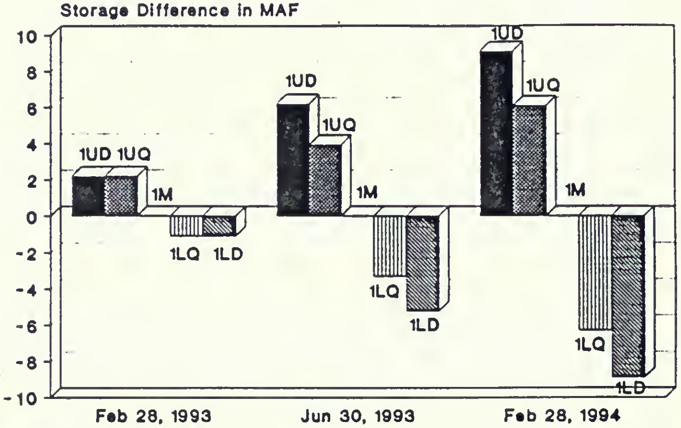
Oahe Pool Elevations
Option 11



1992-1993 AOP (Preliminary)

Main Stem Storage Relative to Option 1M

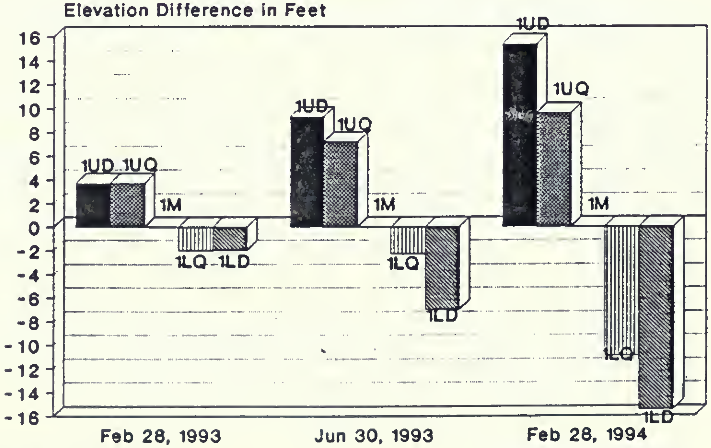
Option 1



1992-1993 AOP (Preliminary)

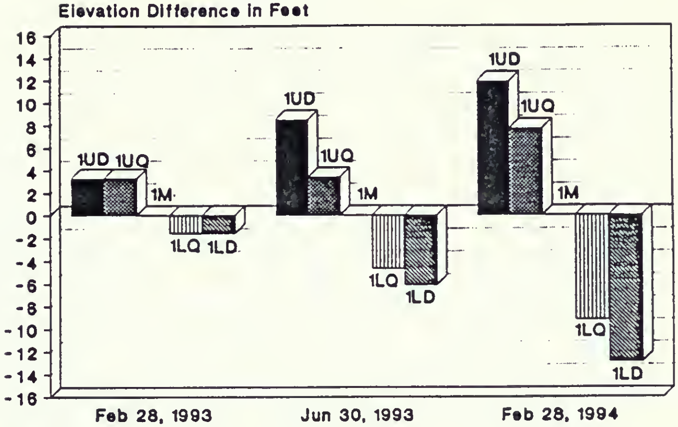
Fort Peck Pool Relative to Option 1M

Option 1



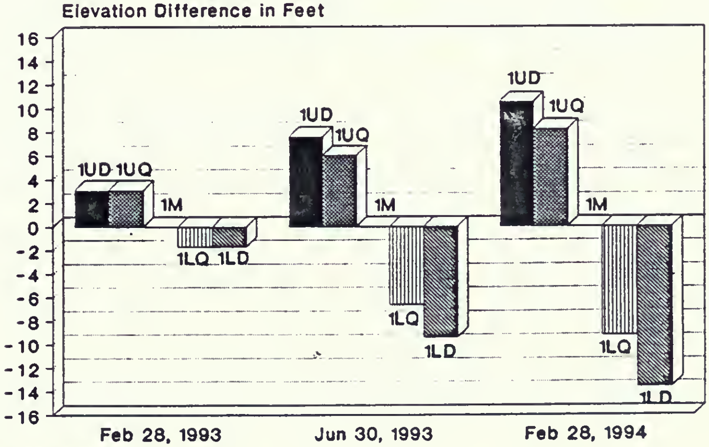
1992-1993 AOP (Preliminary)

Garrison Pool Relative to Option 1M
Option 1



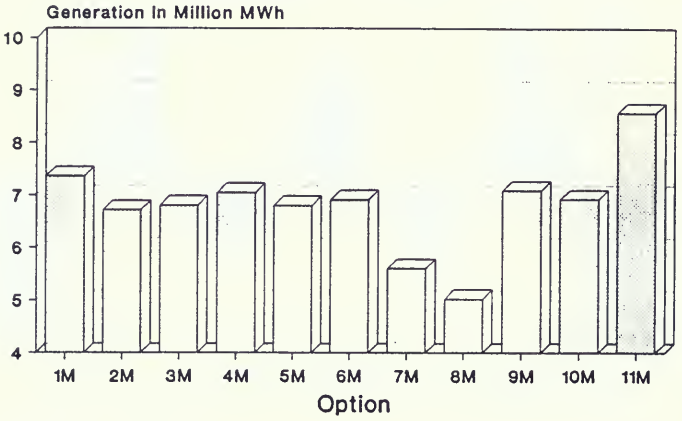
1992-1993 AOP (Preliminary)

Oahe Pool Relative to Option 1M
Option 1

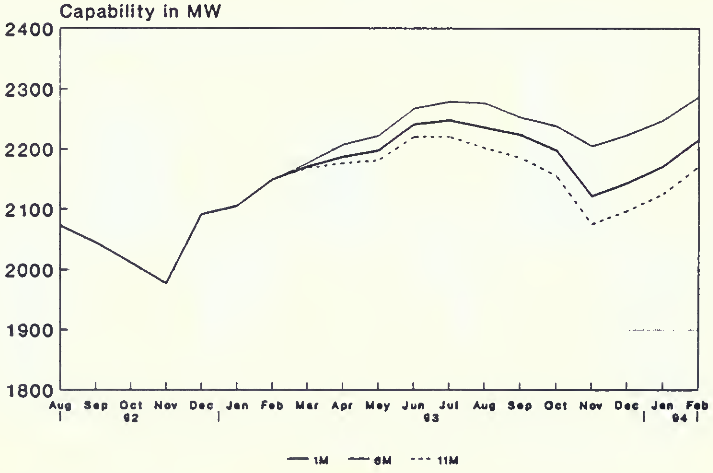


1992-1993 AOP (Preliminary)

Main Stem System Generation
CY 1993



Main Stem System Capability



Summary Statement

1993 Annual Operating Plan - Missouri River

Recommendations

Issues that affect operation of the mainstem dams on the Missouri River are included in the Army Corps of Engineers (C.O.E.) Master Water Control Manual and Annual Operating Plans. The Master Manual is presently under review for update. The Missouri Basin States Association (MBSA) created four committees to oversee review and update. The environmental committee developed, in concert with the C.O.E., a series of values for a range of discharges for important ecological periods of each year. This committee based these value functions on the conclusion that elements of the pre-control (before dams and channelization) hydrograph played an essential role in the quality of life for the native community of flora and fauna, which is clearly supported by the international community of river ecologists (Dodge and Ryder 1989, National Research Council 1992).

The pre-control monthly percentage of total annual volume for the Missouri River was as follows: 3% in Jan, 4.5% in Feb, 9% in Mar, 12.5% in Apr, 10% in May, 17.5% in Jun, 15.5% in July, 7.5% in Aug, 6.5% in Sep, 6% in Oct, 4.5% in Nov and 3.5% in Dec. These values are expanded to cubic feet per second based on mean daily discharge for the period of 1930 - 1939 at Omaha.

Achieving a change in the present water release pattern at Gavins Point raises concern for impact on navigation. We developed a series of correlation models where mean daily discharge was compared among a selected set of gages from Bismarck, ND to Hermann, MO. The pre-control hydrograph was defined with data from the period of 1939 - 1948 and the similarity of the hydrograph was clearly evident across the study reach. We succeeded in defining the declining effect of Gavins Point Dam releases on the downstream hydrograph by correlating mean daily discharge from successive gages with Gavins Point gage. The data suggest that under mean flow conditions in a dry period the influence of Gavins Point releases was small from Kansas City to the mouth. Moreover, we determined by using maximum mean discharge values for these same gages, that the influence of Gavins Point releases do not extend downstream from Nebraska City even using maximum discharge from a dry period (1988 - 1990). In fact maximum discharge during a normal run-off period may move the zone of reduced influence upstream and closer to Omaha.

We used cross-section depth profiles obtained by the U.S.G.S. and C.O.E. to demonstrate, that even under reduced volume discharge in the range of 15 - 20,000 CFS, full service support for navigation is possible throughout the length of the navigation channel. We recommended that specialized channel maintenance structures or even spot dredging be used to deepen isolated spots where the channel is too shallow for full support at 15 - 20,000 CFS, or during the summer and early autumn we recommended only minimum service.

Finally, we discuss extensive biological and physical studies that were completed during the 1970s to evaluate the impact on biota of elevated water temperature from two nuclear power plants on the Missouri River. These studies clearly concluded that increased water temperature from plant operation had only a negligible effect on stream communities. Reduced discharge in July through October would contribute to the limited impact as it relates to water temperature but these impacts would be offset by benefits derived from recovery of a hydrograph more closely representative of pre-control conditions and the benefits for reservoir fisheries and recreation that would accrue from increased storage in the mainstem reservoirs. There would also be clear benefits from an increased top width on the channelized reach and benefits to barge operators through reduced velocity in the channel.

1993 Annual Operating Plan - Missouri River - Recommendations

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Discharge Value Functions

Issues that affect operation of the mainstem dams on the Missouri River are included in the Army Corps of Engineers (C.O.E.) Master Water Control Manual and Annual Operating Plans. The Master Manual is presently under review for update. The Missouri Basin States Association (MBSA) created four committees to oversee review and update. The environmental committee has developed a series of discharge value functions (Figure 1 through Figure 6). These charts were derived from the mean maximum and mean minimum discharge for a dry, pre-control period (1930 - 1939) at Omaha, NE (Figure 7). The effect of the drought of the 1930s was abated in the 1940s (Figure 8), which was reflected by increased mean discharge. However, it seemed reasonable to develop a value rating with the lowest pre-control discharge data because of present day constraints. The period of 1930 - 1949 reflected the pre-control hydrograph at Omaha (Figure 9). The difference in relative water elevation in Figure 9 between the 1800s data and the 1930s and 1960s data resulted from use of a different elevation datum after the 1800s.

High discharge and increasing stage was essential to the Missouri River ecosystem from about the 50th day of the year (20 February) through the 185th day of the year (4 July), excluding 45 days from 15 April through 25 May.

During late April, discharge and stage slowly receded, and May was characterized by stable or slowly increasing stage. All native fish and insects timed reproduction to occur during the stable or rising stage of the flood pulse in March, late April, May, and June. Water birds used high sandbars built during the flood pulse and the declining stage in July to nest on exposed sandbars.

The present hydrograph (Figure 9) characterizes the change in discharge magnitude and timing if one compares the 1966 - 1985 curve to the 1929 - 1948 curve. The altered hydrograph resulted from storage and controlled release of run-off by the large mainstem dams to provide relatively uniform flows of at least 25,000 CFS at Sioux City, IA (minimum service) for navigation purposes. The water released at Gavins Point Dam is supplemented by run-off from lower basin tributaries and timed water releases from reservoirs on the Kansas River. These tributaries impact the hydrograph differently today than before dams were constructed on the mainstem and tributaries.

The Impact of the Gavins Point Altered Hydrograph.

We selected five gage data sets from 1939 - 1948, a pre-control period, and arbitrarily chose Sioux City as the standard to compare mean daily discharge with mean daily discharge from gages at Bismarck, ND; Omaha, NE; Nebraska City, NE; and Hermann, MO. We used Pearson correlation to measure the degree of association between downstream gages and Sioux City (Figure 10). Omaha and

Nebraska City had r values approaching 1.0; the Hermann hydrograph was still highly correlated (r=0.82936). All relationships were significant (p=0.0001). The pre-control Missouri River hydrograph from Bismarck to Hermann was closely associated with the hydrograph at Sioux City. The plots of mean weekly discharge (Figure 12) show the similarities of the hydrographs. The much higher volume at Hermann and greater weekly variability may account for the slightly lower r value.

We conducted a similar exercise with the present hydrograph. Mean daily discharge at Gavins Point Dam was compared with mean daily discharge at nine gages located downstream for the period 1988 - 1990. The relationship changed (Figure 11) with each succeeding gage downriver. Our objective was to determine how far the altered hydrograph at Gavins Point Dam extended downriver. At Sioux City the r value was 0.98488 but at Kansas City the r value was reduced to 0.63282. The slight increase (0.69328) at Waverly may reflect the influence on the Missouri River hydrograph by discharge from the Kansas River reservoirs to recover sufficient volume to meet target navigation stages in the lower Missouri. However, incremental flow from tributaries continued to deteriorate the relationship with the Gavins Point Dam hydrograph until at Hermann (97 miles from the mouth) the r value was 0.27309. Figure 13 shows the plots of mean weekly discharge for each of the gages for 1988 - 1990 period.

In order to evaluate the meaning of changing correlation coefficients, we also compared the hydrograph at Sioux City from

1939 - 1948 (pre-control) to these same nine gages for the period 1988 - 1990 (post-control). Correlation coefficients remained fairly constant for comparisons with the previous nine gages and Gavins Point (Figure 14). By comparing current system operation with the pre-control hydrograph we hoped to define the inherent pre-control variability (mean r = 0.6229), all gages showed an r value between 0.56220 and 0.68106. When we compared the present hydrograph at Gavins Point with these same gages (Figure 11), the r values were as high as 0.98488 at Sioux City and then they continued to decline until the r value reached 0.63282 at Kansas City. The Kansas City gage fell within the range we described as pre-control variability. Therefore we believe adjustment of the present hydrograph at Gavins Point would not dramatically influence the hydrograph downstream from the St. Joe. gage under mean flow conditions in a dry year.

These models were developed with mean discharge data; the distance downstream from Gavins Point, impacted by its hydrograph, was expected to vary during higher or lower flow periods. Mean minimum, annual daily discharge for the period of 1988 - 1990 ranged from 20,517 CFS at Gavins Point to 41,169 CFS at Hermann. When minimum daily discharge for nine gages was correlated with Gavins Point (1988 - 1990 data), the impact of alteration of the hydrograph at Gavins Point extended past Boonville (Figure 15) if we used the r value of 0.6229 as the variability described by the natural hydrograph.

Mean maximum, annual daily discharge for the period of 1988 - 1990 ranged from 27,842 CFS at Gavins Point to 101,545 CFS at Hermann. Correlation coefficients for the nine gages compared with Gavins Point for the period of 1988 - 1990 showed that the hydrograph at Gavins Point was substantially altered by tributary influence already at Nebraska City (Figure 16). The implication is that during drought, Gavins Point can influence the hydrograph nearly 850 miles downstream, but during high run-off periods the navigation channel downstream from Omaha may be as much a function of tributary input as discharge from Gavins Point.

The Needs for Navigation - Depth and Discharge.

The difference between the post-control hydrograph and the pre-control hydrograph includes the reduction of discharge in March through June and the increase of discharge from July through November. Reducing discharge from July through October from 35,000 CFS (full support navigation) to 15-20,000 CFS would save water, part of which could be used to increase discharge during March through June to emulate the flood pulse, and part could be used to increase storage in upstream reservoirs.

Cross-section data from the navigation channel suggest that water may be wasted in a significant way under present operations and present channel shape. For example; at Nebraska City channel depths are at or exceed 9 ft (full service depth) throughout 84% of the channel cross-section (Figure 17) at 15,000 CFS. While at 21,700 CFS, 75% of the cross-section averaged more than 12 ft in depth (Figure 18). As volume discharge approaches what is considered minimum service flows (25,000 CFS) maximum depth exceeds 18 ft at Tekamah and 45% of the channel exceeds the 9 ft maximum service depth (Figure 19). At 28,672 CFS near Waverly, MO, where the channel is nearly 200 ft. wider, maximum depth on the cross-section exceeds 16 ft (Figure 20), and nearly 60% of the channel exceeds 10 ft in depth. The target flow for full service navigation at Waverly is about 42,000 CFS, and yet at Waverly, full service depth was exceeded (23 February 1991), with less than 30,000 CFS. The C.O.E. has set a target of 45,000 CFS at Hermann, but at 34,800 CFS about 69% of the channel cross-section exceeded 11 ft in depth (Figure 20).

The target discharge for adequate navigation depths was set to meet the requirement with few groundings and little dredging (C.O.E. 1985). It is our understanding that channel control structures are available which can alleviate site specific groundings. It is also our understanding that similar effort to reduce water depth by increasing top width has been discussed for the Mississippi River (personal communication; Norm Stucky, Missouri Dept. of Conservation, Jefferson City). Reduced discharge would also reduce velocity, which would benefit the navigator as well as fish and wildlife. In addition, reduced velocity would smooth out bedforms, thus increasing depth, and reduced velocity would increase fuel economy for the navigator.

As an aide to enhancing environmental restoration some of the water that is presently wasted could be used to increase top width of the navigation channel, while some is stored to enhance reservoir fisheries and some is released to enhance riverine fish reproduction and floodplain linkage each spring.

Reduced Volume Discharge and its Effects on Water Temperature at Power Plants.

Concern has been voiced regarding the impact of reduced summer discharge on riverine water quality, in particular the resultant increase in water temperature at the two nuclear power plants in Nebraska. During the pre and post operational start-up phase of Cooper and Fort Calhoun, a wide array of physical and biological studies were conducted near these plants (Hesse et al. 1982). Thermal plume mapping was conducted as part of these studies on 32 occasions between October 1973 and September 1976. The maximum width of the plume ranged from 16 ft to 282 ft. The average extension of the 2.8 C isotherm (delta T) was about 1,345 ft at Fort Calhoun and 558 ft at Cooper. Thermal plume dispersion was greatest when discharge was high. For example, at Fort Calhoun in 1975, flow averaged 62,180 CFS, power generation was at 87% of capacity, and the 2.8C isotherm never extended more than 591 ft downstream. Low flow (as low as 13,841 CFS) resulted in thermal plume extensions (2.8 C isotherm) as far downstream as 5,485 ft. It is entirely conceivable that the 2.8 C isotherm would extend even somewhat farther with a discharge of 15 - 20,000 CFS if it occurred during July and August when ambient temperature may exceed 27 C. However, the biological studies conducted to evaluate the effect of thermal effluents on biota suggested that the only quantifiable effects were mechanical and not temperature related (Hesse et al. 1982). Impact on periphyton, zooplankton and macroinvertebrates was considered negligible. Impact on larval fish by the thermal plume was not quantifiable; however, the plants were attributed with the mechanically induced mortality of 3% of larvae drifting past the plant. Adult fish were not impacted by the thermal plume; however, adult fish were killed in the cooling water extraction process (Hesse et al. 1982).

In the final analysis we believe that site specific impact to the biotic community under existing operation of Fort Calhoun and Cooper was very small. It is conceivable that increasing the delta T or extension of the plume under a discharge schedule including 15 - 20,000 CFS during the summer and autumn would escalate the slight impact, but in our judgement, not sufficiently to offset the benefits derived by saving water which could be released at critical times for the entire native community, in the reservoir and riverine reaches. We highly recommend a split navigation season for 1993, construction of necessary channel structures to eliminate grounding problem areas, and review of our suggestions as part of the fine tuning phase of Master Manual modeling. We believe there is sufficient water available to meet navigation needs, to maintain adequate storage in the reservoirs for fish, wildlife and recreation, to emulate a flood pulse in the spring in riverine reaches, and to increase top width and reduce velocity in the navigation channel from Sioux City to the mouth.

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National Research Council. 1992. Restoration of Aquatic Ecosystems National Academy Press, Washington D.C. 552 p.

Figure 1. Discharge value function recommended for the months of March and April at Gavins Point Dam.

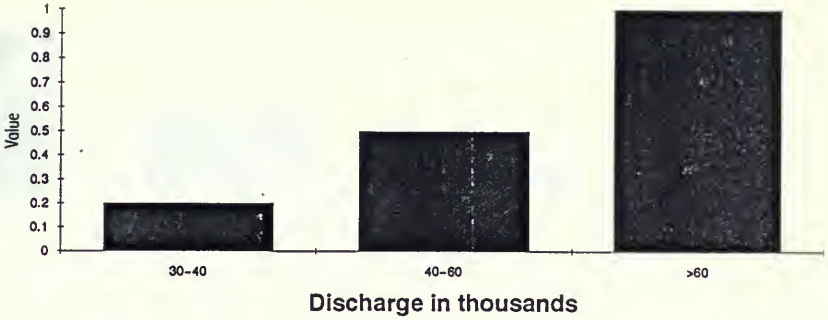


Figure 2. Discharge value function recommended for May at Gavins Point Dam.

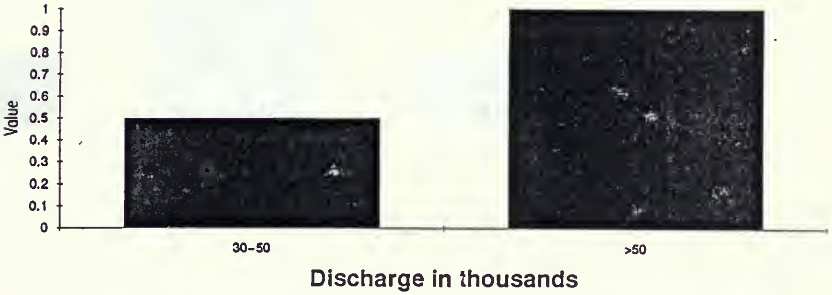


Figure 3. Discharge value function recommended for June at Gavins Point Dam.

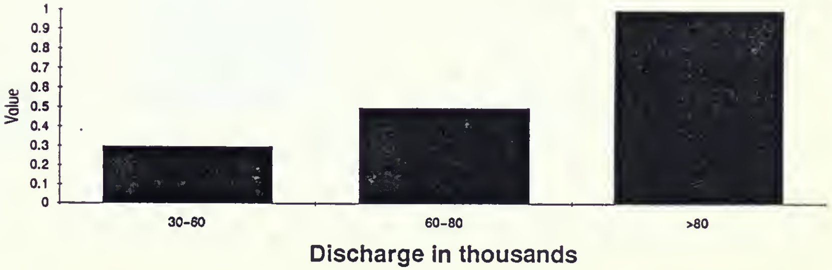


Figure 4. Discharge value function recommended for July at Gavins Point Dam.

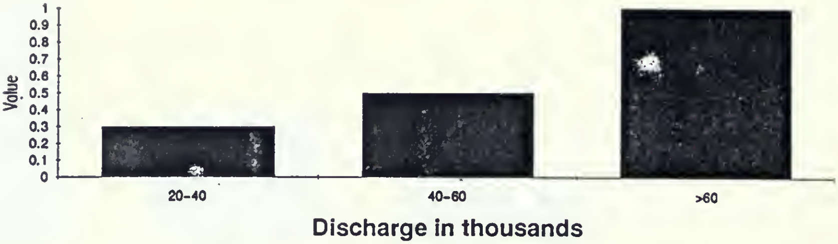


Figure 5. Discharge value function recommended for August through October at Gavins Point Dam.

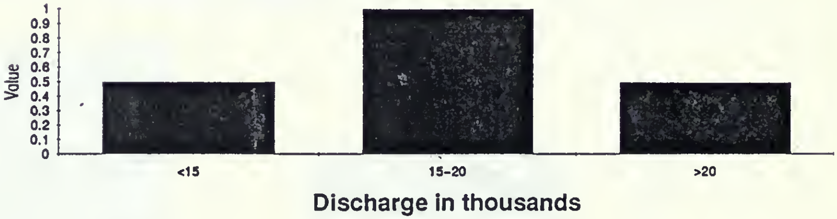


Figure 6. Discharge value function recommended for November through February at Gavins Point Dam.

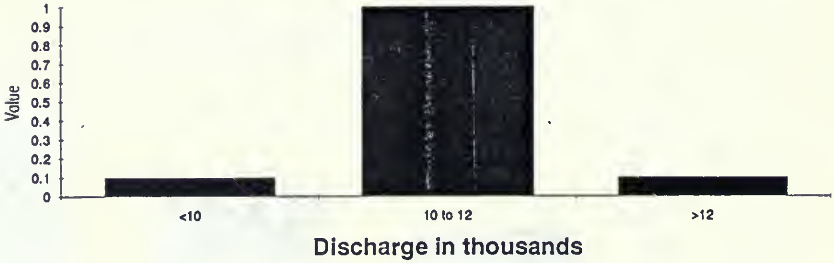


Figure 7. Mean, maximum and minimum discharge for the Missouri River at Omaha, NE, 1930–1939.

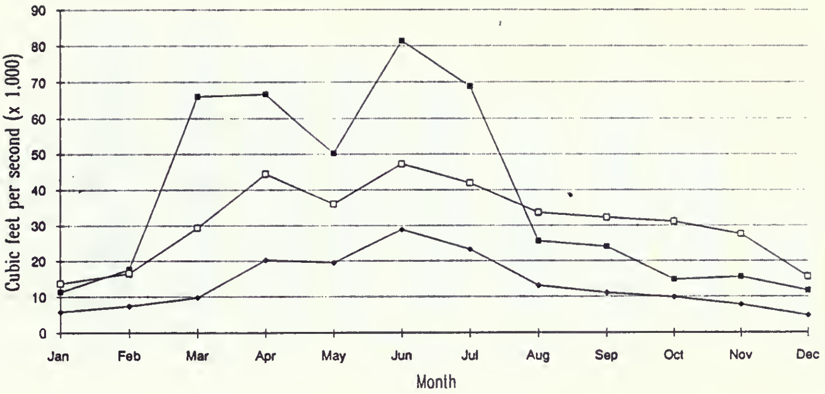


Figure 8. Mean, maximum, and minimum discharge for the Missouri River at Omaha, NE, 1940–1949.

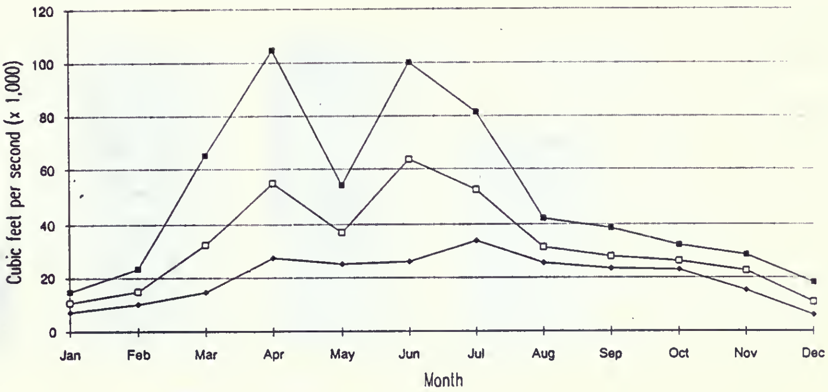


Figure 9. Mean daily water elevation of the Missouri River at Omaha,NE, 1880–1899, 1929–1948, 1966–1985.

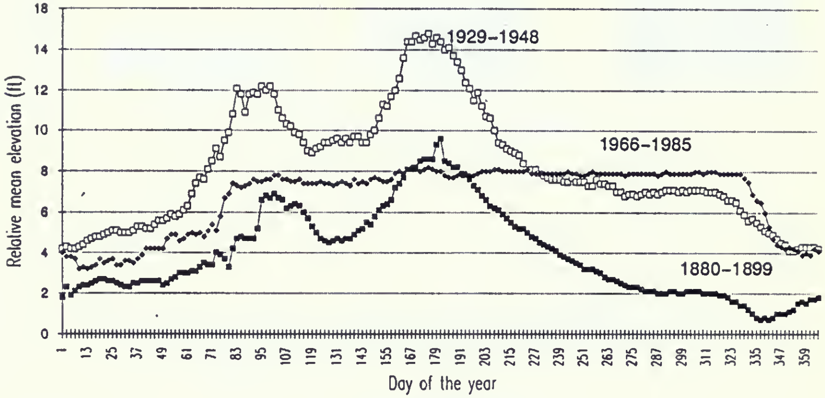


Figure 10. Relationship between mean daily discharge at Sioux City, IA and four other Missouri River gages for the period 1939–1948.

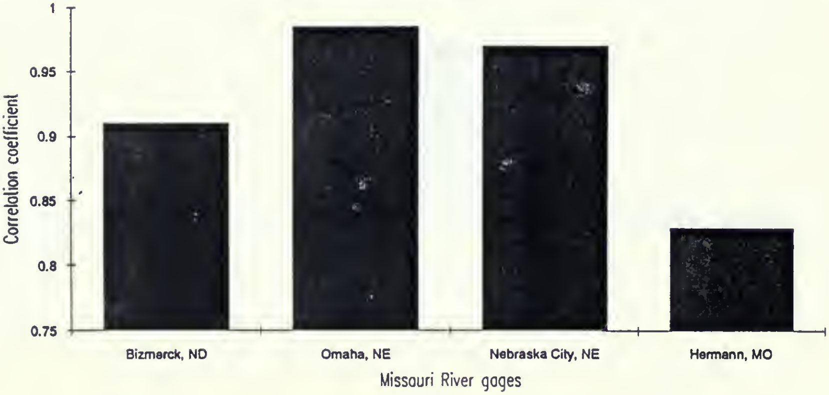


Figure 11. Relationship between mean daily discharge at Gavins Point Dam and nine Missouri River gages for the period 1988-1990.

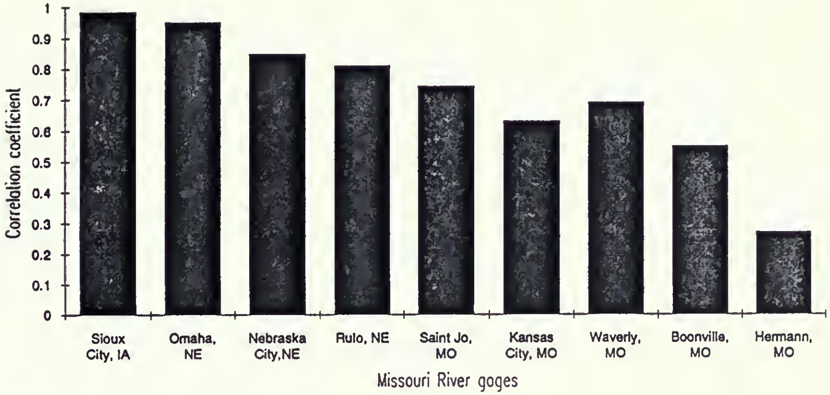


Figure 12. Mean weekly discharge for the period 1939-1948 for five Mis .ri River gages.

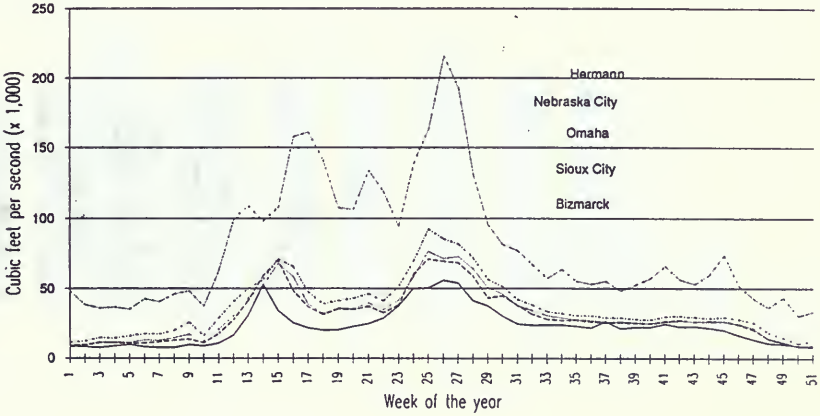


Figure 13. Mean weekly discharge for the period 1988–1990 for nine Missouri River gages.

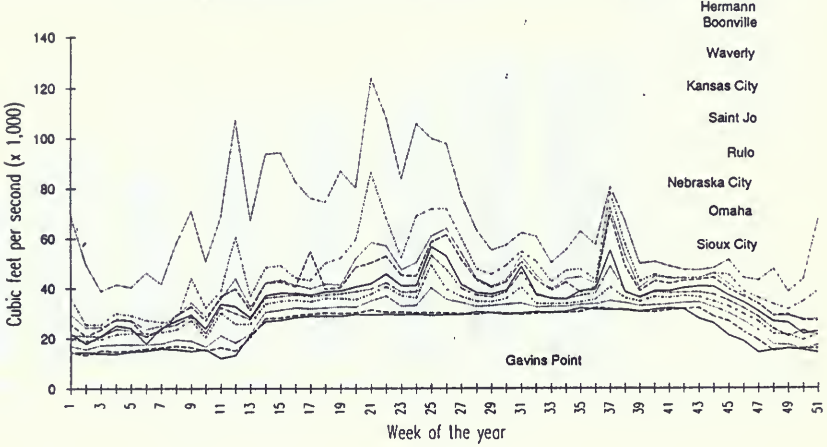


Figure 14. Relationship between mean daily discharge at Sioux City, IA for the period 1939 – 1948 and ten gages for the period 1988 – 1990.

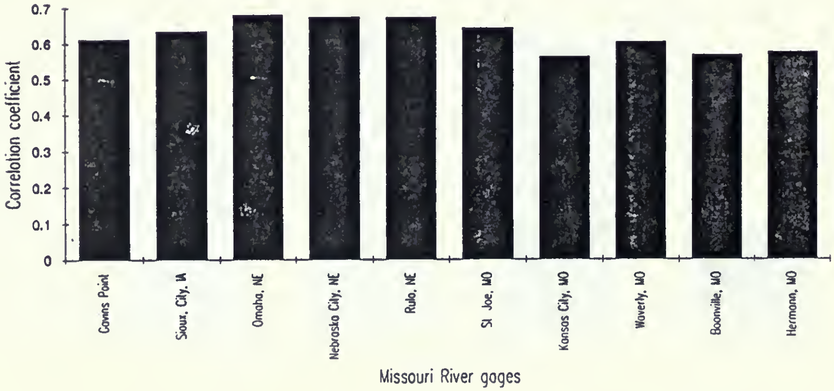


Figure 15. Relationship between minimum daily discharge at Gavins Point for the period 1988 – 1990 and minimum daily discharge at nine gages for the period 1988 – 1990.

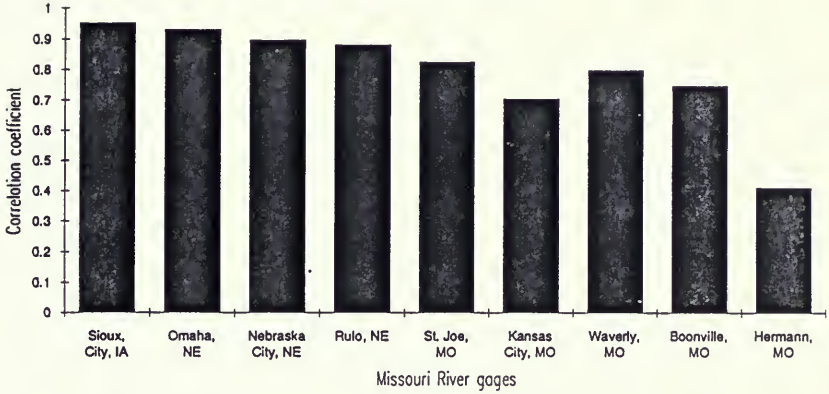


Figure 16. Relationship between maximum daily discharge at Gavins Point for the period 1988 – 1990 and maximum daily discharge at nine gages for the period 1988 – 1990.

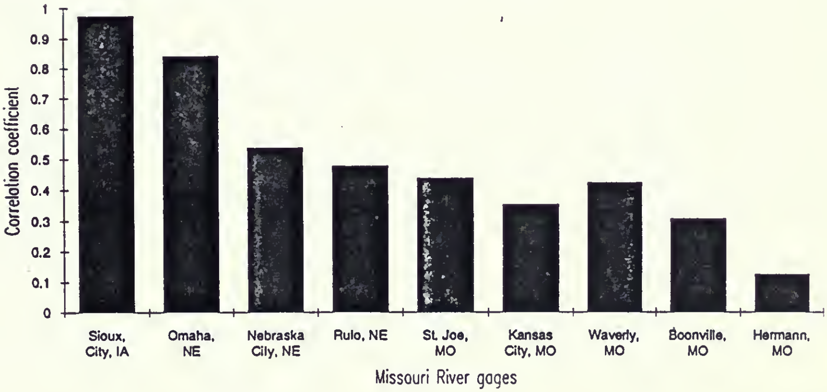


Figure 17. Depth profile of the Missouri River at Nebraska City, 7 December 1990, at a water discharge of 15,000 cubic feet per second. Data provided by the U.S.G.S. and the C.O.E.

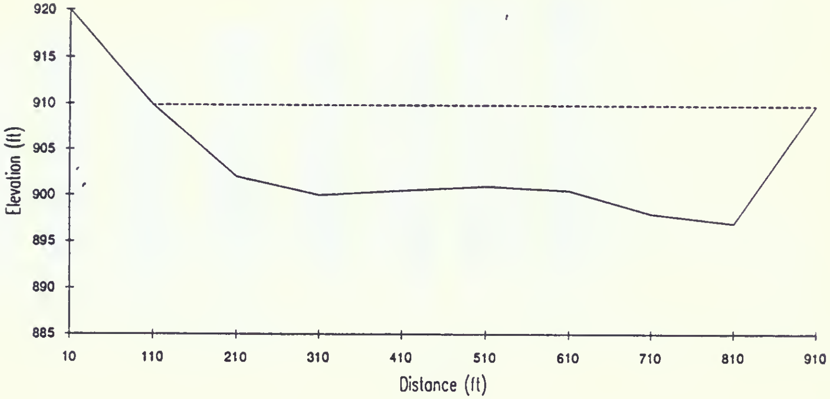


Figure 18. Depth profile of the Missouri River at Nebraska City, 26 February 1990, at a water discharge of 21,700 cubic feet per second. Data provided by the U.S.G.S. and the C.O.E.

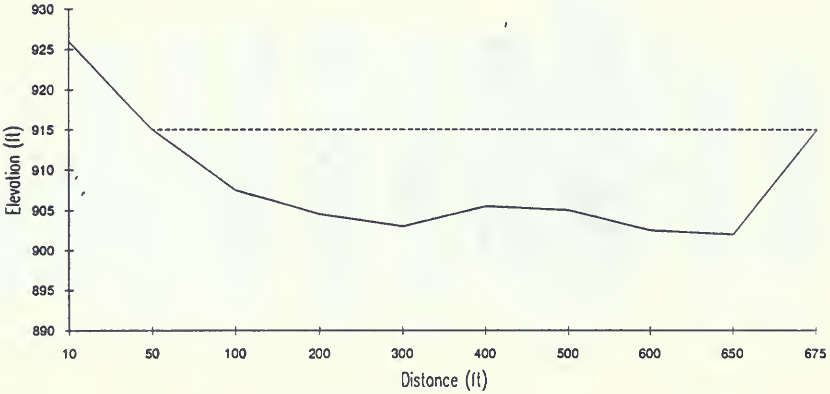


Figure 19. Depth profile of the Missouri River at Tekamah, 23 April 1991, at a water discharge of 25,600 cubic feet per second. Data provided by the U.S.G.S. and the C.O.E.

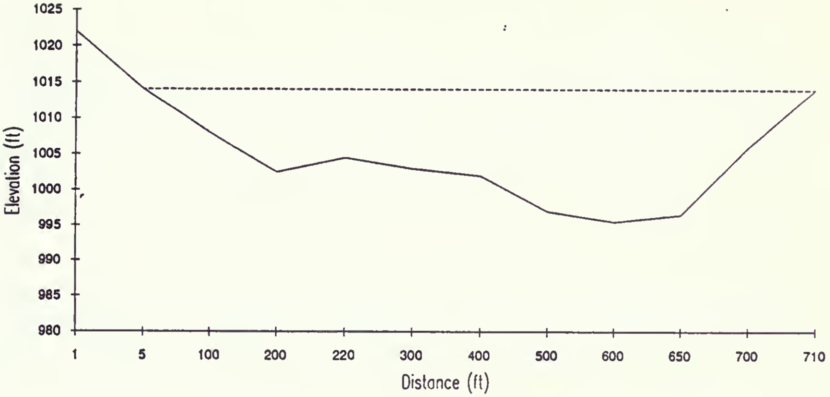


Figure 20. Depth profile of the Missouri River at Waverly, 23 February 1991, at a water discharge of 28,672 cubic feet per second. Data provided by the U.S.G.S. and the C.O.E.

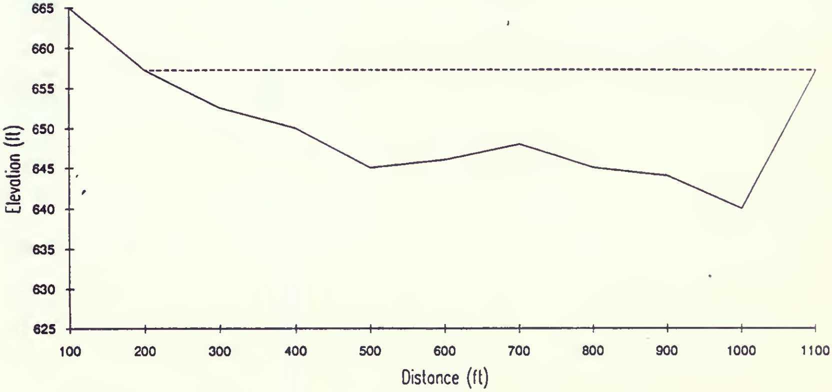
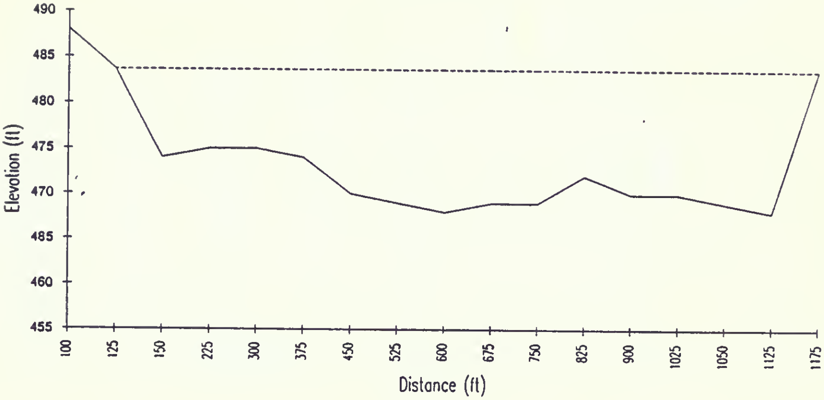


Figure 21. Depth profile of the Missouri River at Hermann,20 February 1991, at a water discharge of 34,800 cubic feet per second. Data provided by the U.S.G.S. and the C.O.E.



EVALUATION OF EFFECTIVENESS OF THE MRNRC

Background

At the March, 1992, meeting of the MRNRC, the Chairman made an assignment to the Coordinator to perform an evaluation of the effectiveness of the Committee. This task had been identified by the past Chairman as a desirable exercise after five years of existence by the Committee. The review would include an analysis of what may be needed to improve effectiveness in the next five years. The following is my assessment.

Procedure

Any analysis of effectiveness requires a revisit to organizational objectives. Fortunately, the MRNRC has set down a list of objectives in its constitution. These objectives and purposes are relisted here as found in Article II.

1. To facilitate a systems approach to managing the natural resources of the Missouri River.
2. To promote preservation, wise utilization, and enhancement of the natural and recreational resources of the Missouri River.
3. To formulate policies, plans, and programs for carrying on cooperative research and management studies for the above-stated purposes.
4. To keep necessary records on consumptive and recreational use, and to publish and distribute reports.
5. To recommend to the governing state bodies activities and programs which further the Committee objectives.
6. To provide coordinated recommendations to appropriate agencies on the operation and maintenance of the Missouri River main stem management.
7. To make coordinated research and study proposals to appropriate management and approval agencies in furtherance of the Committee objectives.

The next step is to revisit our annual reports and our files to see where we have spent our time and the kinds of activities we have involved ourselves with. Comparing accomplishments from meeting minutes, the Coordinator's report, and the Chairman's report with our objectives can provide some sense of how well we are addressing our objectives and purposes.

Analysis

1. **To facilitate a systems approach to managing the natural resources of the Missouri River.**

Interestingly, nurturing a systems approach to river management, was the first objective listed by the group. In reading past Chairman reports, this is an area where all felt accomplishment by the committee. Indeed, this has been (and will continue to be) one of the most significant accomplishments of the group in that the river is being viewed as one river rather than by segments. Without that view, and the cooperative attitude of the group, willingness to offset the upper three storage reservoirs would not have occurred. Without looking at the river as a system, and without recognizing the many resources that depend upon the river for their welfare, the Committee could not have made its landmark agreement to recommend a split season for the 1992 AOP. This recommendation occurred in recognition of the whole river operating as a system and, most importantly, a recognition of the river processes that are important to the welfare of a broad array of species.

2. **To promote preservation, wise utilization, and enhancement of the natural and recreational resources of the Missouri River.**

Measurement of success for this objective is one of subtlety. Letters of support for lower river mitigation, large river legislation, and Missouri River coordination show involvement of the Committee in promoting wise use, preservation, and enhancement. Reports by several chairman, however, and comments by members made at several meetings, suggest that there is desire from a number of people that the Committee take an even stronger leadership role in promoting wise use of the river. Others seem to recognize the uniqueness of this group and a desire to proceed slowly until the group has at least had a chance to experience the growing pains of a youthful organization and have managed to get their feet firmly planted. There is an obvious recognition, however, by all that the group will begin to become more active and more forceful in the future in promoting wise use of the river. The Committee has recognized its unique role as spokesman for the river's natural resources and has shown an expectation of shouldering more of the load as it gains a better foothold.

Critical strides have been made by the Committee in the first five years to be effective in this objective. Through its professional manner in approaching resource issues, it is becoming accepted as "a force to be reckoned with" on Missouri River issues and enjoys a professional image from other agencies. The group, however, is still weak in being recognized broadly and needs some public exposure if wishing to be widely recognized as a group having river expertise.

3. **To formulate policies, plans, and programs for carrying on cooperative research and management studies for the above-stated purposes.**

Our first annual report contains a prioritized short term and long term list of management and development actions needed. Paddlefish and sturgeon studies; status surveys of rare species; tern, plover, and eagle habitat studies; and basic productivity studies were a few of the management priorities identified. Rehabilitation of chutes; subimpoundment units along the reservoirs; reef development; and artificial sand bar and island creation were some of the development activities identified. Many long term management decisions were viewed as important including the documentation of the value of recreation; adopting system-wide fishery objectives; identifying critical habitats for rare species; and coordinating data collection. Long term development needs generally fell under the theme of recognizing the need to reestablish naturally functioning processes. Perhaps because we have been consumed in reacting to drought conditions in the basin for the last few years, not much time has been spent addressing this objective. Formation of the rare and endangered fish subcommittee and the tern and plover management subcommittee will allow an opportunity to begin addressing some of the issues identified earlier but not without some clear directives to subcommittee chairs. Some of the other activities identified are being addressed, but not under the auspices or direction of the Committee.

4. **To keep necessary records on consumptive and recreational use, and to publish and distribute reports.**

Although identified as an objective, and in our prioritized list as a necessary activity, nothing has been done by the Committee to promote this area of endeavor. Mention was made at several meetings that, perhaps, the annual reports should contain annual data on stocking, commercial catch figures, and recreational use but we have not followed through on these ideas. Mr. Farabee will be reporting at this meeting on recreational surveys, and how collection of meaningful recreational data was obtained by our sister organization on the Upper Mississippi.

5. **To recommend to the governing state bodies activities and programs which further the Committee objectives.**

As yet, we have not done this activity as a Committee. The closest action to this objective would be our overlapping member responsibilities to the MBSA environmental subgroup, however, this is not being done under the purview of the Committee. Another activity that would have fit under this category is the closing of commercial catfish fishing in the lower Missouri. Although this Committee was briefed on the activity, there is nothing in the record to show that the Committee either supported or did not support the closing or that it took action to recommend to the respective states one way or the other on the issue.

Ongoing work and subsequent recommendations of the two subcommittees, will likely fall under this objective; especially as they address long term recommendations and coordinated efforts to address tasks charged them.

6. To provide coordinated recommendations to appropriate agencies on the operation and maintenance of the Missouri River main stem management.

In reading annual reports and committee correspondence, this objective has been where we have had our principle involvement since conception of the organization. Background of many of the members and pressure of the drought to focus efforts on emergency management has likely favored our efforts to this one objective. An example of the overriding focus on this objective is that our two regularly scheduled meetings are designed to provide recommendations to the Corps on annual operation of the system.

However, much progress has also been made in becoming effective in this arena. In the past, natural resource recommendations for operations were provided in March in reflection of anticipated run off from snow pack. The Committee now provides general recommendations in the fall for development of the AOP for the following year with specific adjustments in March to reflect "fine tuning" based on snow pack projections. As a result, generic recommendations on management of the upper three large reservoirs have been developed for the Corps and are well understood by its operations staff. Minimal release flow recommendations have been coordinated and developed below Fort Peck Dam and Fort Randall Dam. A generic scenario has been developed for vegetation utilization at the upper three dams for rising water levels and opportunities to offset system storage has been explored when conditions present themselves. Scope of Committee recommendations soon engulfed obligations for protecting endangered species and the Committee quickly responded to this new coordination need. The effective coordination of recommendations for operations culminated in a single recommendation arrived at last year by the Committee for the next year's AOP. Attempts to coordinate Committee recommendations with the MBSA this year, underscores the attempts of the Committee to increase effectiveness even further in this objective.

7. To make coordinated research and study proposals to appropriate management and approval agencies in furtherance of the Committee objectives.

The management and development prioritization effort performed the first year is the only effort expended under this objective. Development of the list identified high priority research and study needs but coordinated proposals have never been generated. Again, the existing two subcommittees will likely address these subjects for their specific areas of concern.

Conclusion

As with any new organization, it takes several years of growing before the group becomes comfortable with its function. And, during this time, a pattern of kinds of activities the group will be involved with occurs and a standard of conduct is also developed. If changes are desired, a conscious effort is necessary by the leadership to redirect the flow of the organization to redefine its standards of conduct. The MRNRC has undergone such "growing pains" in its first five years and it is appropriate to evaluate itself at this time to see if it consciously wishes to change its conduct or initiate new directions.

My first observation is that formation of the Committee was a significant event in itself that has helped the resources and has set a path that can be critical to the welfare of the resources in the years ahead. Pressures will continue to divide the waters of the Missouri amongst its users and this Committee will play a role in the future in "caring for the Missouri River's resources". The conduct standard that the Committee has developed, one of professionalism and willingness to work together with other interests, is one that the Committee will surely wish to diligently retain. Formation of the Committee has also allowed the treating of river issues to occur from a system perspective. That is the only perspective that can be successful in solving long range issues in river management and river planning. So, the stage is set for the Committee to do good things on the river, it becomes important to analyze how we do business.

Of the seven objectives that the Committee identified for itself at its inception, two are being done very well, one is improving, and four need direction. Some general observations may help.

The Committee has done an excellent job in looking at the river as a system but we have fallen somewhat short in incorporating lower river flow needs into the considerations. This can be addressed further in discussing Number 6, Recommendations on Operations.

Several past Chairman have hinted that the committee could be more effective if it took a more proactive role in promoting the river. Considerable progress has been made in this area by including agencies like the Bureau and Western Power and by inviting the Missouri Tribes to attend meetings as was done this year. We still suffer, however, in lack of public recognition. Explanation of our "generic" recommendations to sportsman's groups, professional organizations, environmental organizations and even the press could help us in "promoting" wise use of the river and its resources. A conscious decision on what the Committee wishes to do in this regard is needed and a well thought out process is necessary if we expand on this objective.

The drought, and reacting to drought conditions, has obviously influenced where the Committee has spent its time for the last several years. However, we will not always be in drought conditions and several objectives are not being addressed at present. An aggressive decision is necessary to embark the Committee on confronting the four objectives not now being addressed. However, addressing these objectives is important in order to break a habit of reacting only to crises.

Addressing the other objectives, however, will require resolve of the Executive Committee to provide thought and guidance in these areas. If the committee wishes to retain recognition as experts in Missouri River resource issues and a body that has coordinated recommendations, future concerns need to be identified now so that sufficient data can be gathered to make wise decisions. Coordinated decisions require coordinated data collection. Considering that all of us have other duties as well, and that considerable thought and effort is required to make in-depth analyses on many of these subjects, the question comes as to how can the Committee effectively address these issues?

An Executive Committee special meeting designed just to address the future direction of the MRNRC and how to address those objectives now being missed may be advisable. However, the "answer" is already available. the work horses of any organization are committees charged with specific tasks. The MRNRC already has two subcommittees that have been charged with specific responsibilities. Both could use some guidance from the Executive Committee and this guidance should be in writing for the chairman. Since the Executive Committee does not have time to delve into many technical issues in depth, other subcommittees which have special expertise may also be necessary.

There is one other important reason for having subcommittees in an organization that is often missed. Greg Power, in his report as Chairman, noted that the Committee has a member continuity problem. This can be a serious impairment to an organization like the MRNRC where it takes many years to understand river processes, how the river functions as a system, how the river is operated, what the operational constraints are, which constraints are real and which are perceived, and who all the players are. Members of both the present subcommittees are going through learning curves now that will help them to learn the river and become more effective. The future effectiveness of any organization depends on the expertise of the leadership. The expertise of that leadership depends upon their background and experience. MRNRC subcommittees can help greatly in assuring that the future leadership of the MRNRC will have had a chance to climb this complex learning curve and will assure that the Committee will not be handicapped by "green" members learning the ropes. Experienced representatives that have had an opportunity to climb the learning curve will assure that the MRNRC will continue to grow in its effectiveness.

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
P.O. BOX 103, DOWNTOWN STATION
OMAHA, NEBRASKA 68101-0103

REPLY TO
ATTENTION OF

August 11, 1992

Reservoir Control Center

TO: MRNRC MEMBERS

Mr. Kent Keenlyne
Mr. Norman Stucky
Mr. Greg Power
Mr. Thomas Gengerke
Mr. Chris Hunter
Mr. Dennis Unkenholz
Mr. Steve Adams
Mr. Gene Zuerlein

As discussed at the August 3-4, 1992, Missouri Basin States Association (MBSA) Technical Advisory Committee meeting held at Pierre, South Dakota, regarding the Corps of Engineers regulation studies for the 1992-1993 Annual Operating Plan, options 1, 4, and 5 have been updated to reflect August 1 conditions, using an annual runoff forecast of 17.1 million acre-feet. Option 9 was modified at the request of the Missouri River Natural Resources Committee (MRNRC) during their August 4-6 meeting to reflect what they termed "a natural hydrograph." In that study, Gavins Point releases were set at 24,000 cubic feet per second in August and September 1993.

A table indicating support given to navigation and winter releases is enclosed. Abbreviated studies and graphics are also enclosed for your review and analysis. This information is being sent to the MBSA representatives who attended the Technical Committee meetings, the MBSA Executive Director, and MRNRC members. We expect the MBSA Technical Committee will share these studies with the Directors.

Extensions of these studies to March 1, 1999, will be completed and mailed by August 21, 1992.

If you have any questions on the enclosed information, please call me at (402) 221-7347 or Bob Keasling at (402) 221-7352.

Sincerely,

Duane J. Sveum

Duane J. Sveum, P.E.
Chief, Reservoir Control Center
HTRW and Engineering Directorate

Enclosures

Preliminary 1992-1993 AOP Regulation Studies
MBSA Directors Meeting
August 31-Sep 1, 1992

Option 1

Inflow Forecast:
Option 1UD - Upper Decile
Option 1UQ - Upper Quartile
Option 1M - Median
Option 1LQ - Lower Quartile
Option 1LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: In accordance with Master Water Control Manual (MM)
Length - 8 months (MM)
Service level - in accordance with MM

1993-94 winter release: Higher of minimum based on experience or as specified in MM

Option 4

Repeat adopted plan from 1991-1992 AOP

Inflow Forecast:
Option 4UD - Upper Decile (Same as 1UD)
Option 4UQ - Upper Quartile (Same as 1UQ)
Option 4M - Median
Option 4LQ - Lower Quartile
Option 4LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length -

Option	Delay in Opening	Early Closing
4UD	none	none
4UQ	none	none
4M	none	2 weeks
4LQ	none	4 weeks
4LD	none	5 weeks

Service level - in accordance with MM

1993-94 winter release: Higher of minimum based on experience or as specified in MM

Option 5

Delay opening and early closing of navigation season

Inflow Forecast:
Option 5UD - Upper Decile
Option 5UQ - Upper Quartile
Option 5M - Median
Option 5LQ - Lower Quartile
Option 5LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length -

Option	Delay in Opening	Early Closing
5UD	3 weeks	none
5UQ	3 weeks	none
5M	3 weeks	2 weeks
5LQ	3 weeks	4 weeks
5LD	3 weeks	5 weeks

Service level - minimum service

1993-94 winter release: Minimum based on experience except 5UD as specified in MM

Modified Option 9

"Natural hydrograph"

Inflow Forecast:
Option 9UD - Upper Decile
Option 9UQ - Upper Quartile
Option 9M - Median
Option 9LQ - Lower Quartile
Option 9LD - Lower Decile

1992-93 winter release: Minimum based on experience

1993 navigation season: Length - Apr 1-Jul 31
Oct 1-Dec 1

Service level - minimum service
no support Aug 1-Sep 30 (24,000 cfs)

1993-94 winter release: Minimum based on experience except 9UD as specified in MM

Preliminary 1992-1993 AOP Regulation Studies

Service Levels, Navigation Season Length and Winter Release
(Storage in MAF, Release in 1,000 cfs, Navigation Season Length in months)

		March 15, 1993			July 1, 1993					September 1, 1993		
		Service Level			Service Level					Fort Randall Dec-Feb Release		
		> Min Service			> Min Service		Season Length				Master Manual	
Option	Storage	Study	MM	Storage	Study	MM	Study	MM	Storage	Study	Table 10	> Table 10
1UD	46.4	0.3	0.3	55.6	3.6	3.6	8	8	57.2	14.5	14.5	0.0
1UQ	46.5	0.4	0.4	53.2	1.9	1.9	8	8	54.2	12.4	12.4	0.0
1M	44.4	0.0	0.0	49.9	0.0	0.0	8	8	49.7	10.3	9.4	0.9
1LQ	42.9	0.0	0.0	46.4	0.0	0.0	8	8	45.0	9.9	6.3	3.6
1LD	42.9	0.0	0.0	44.5	0.0	0.0	8	8	42.8	9.9	5.0	4.9
4M	44.4	0.0	0.0	49.9	0.0	0.0	7.50	8	49.7	10.4	9.5	0.9
4LQ	42.9	0.0	0.0	46.4	0.0	0.0	7.00	8	45.0	10.0	6.3	3.7
4LD	42.9	0.0	0.0	44.5	0.0	0.0	6.75	8	42.8	10.0	5.0	5.0
5UD	46.4	0.0	0.3	56.1	4.0	4.0	7.25	8	57.7	14.8	14.8	0.0
5UQ	46.5	0.0	0.4	53.9	0.0	2.4	7.25	8	55.1	10.6	13.1	-2.5
5M	44.4	0.0	0.0	50.5	0.0	0.0	6.75	8	50.3	10.4	9.8	0.6
5LQ	43.0	0.0	0.0	46.9	0.0	0.0	6.25	8	45.5	10.0	6.7	3.3
5LD	42.9	0.0	0.0	45.1	0.0	0.0	6.00	8	43.4	10.0	5.3	4.7
Modified Option 9												
9UD	46.4	0.0	0.3	55.8	0.0	3.7	6	8	58.2	15.2	15.2	0.0
9UQ	46.5	0.0	0.4	53.4	0.0	2.1	6	8	54.9	10.6	13.0	-2.4
9M	44.4	0.0	0.0	49.9	0.0	0.0	6	8	50.1	10.3	9.7	0.6
9LQ	42.9	0.0	0.0	46.4	0.0	0.0	6	8	45.4	9.9	6.6	3.3
9LD	42.9	0.0	0.0	44.6	0.0	0.0	6	8	43.2	9.9	5.2	4.7

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 1UD & 1UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Data: 08/09/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.4	2212.0	2212.2	2213.1	2213.9	2213.1	2212.4	2212.5
DISCH KCFS	7.2	6.0	4.5	3.1	3.7	8.0	9.0	8.0
GARRISON								
ELEV FTMSL	1824.9	1824.4	1824.2	1824.5	1824.2	1822.8	1821.5	1820.5
DISCH KCFS	19.2	18.0	14.0	10.8	13.0	19.0	21.0	21.0
OAHE								
ELEV FTMSL	1590.0	1589.6	1589.8	1589.7	1591.1	1591.6	1592.6	1594.2
DISCH KCFS	20.2	18.9	14.4	11.2	6.7	15.9	16.7	15.1
BIG BEND								
ELEV FTMSL	1419.7	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	17.9	14.5	10.3	6.8	15.7	16.7	15.1
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1344.8	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	21.0	22.4	25.6	17.8	6.9	10.4	11.3	8.6
GAVINS POINT								
ELEV FTMSL	1205.4	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45474	44984	44372	44159	44546	44502	44654	45189
ENERGY GWH	3407	637	545	393	283	520	564	466
PEAK POWER MW		2102	2082	2050	2019	2134	2156	2203

PRELIMINARY 1992-1993 AOP UPPER DECILE RUNOFF - OPTION 1UD

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK													
ELEV FTMSL	2212.5	2214.9	2217.4	2220.6	2227.5	2231.9	2232.2	2233.2	2234.1	2234.1	2233.2	2232.1	2232.0
DISCH KCFS	8.0	4.5	6.0	8.0	8.5	8.5	8.5	4.2	4.2	6.5	10.0	11.0	11.0
GARRISON													
ELEV FTMSL	1820.5	1821.6	1826.0	1828.1	1835.4	1840.1	1839.7	1839.1	1838.5	1838.2	1837.5	1836.2	1835.5
DISCH KCFS	21.0	19.0	20.0	23.0	23.5	23.5	23.5	17.3	15.2	16.4	20.0	26.0	25.0
OAHE													
ELEV FTMSL	1594.2	1598.8	1603.0	1604.3	1606.3	1605.8	1604.3	1603.1	1602.8	1602.6	1603.2	1604.0	1605.5
DISCH KCFS	15.1	9.5	17.4	22.4	19.5	28.5	30.5	27.9	19.8	19.9	19.4	21.5	17.5
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	9.5	17.4	22.4	19.5	28.4	30.2	27.6	19.5	19.6	19.3	21.5	17.5
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	11.2	20.3	24.2	22.4	28.9	30.6	30.6	29.7	27.2	14.3	14.5	14.5
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	13.9	23.1	26.2	26.8	30.8	31.8	32.1	31.1	29.1	15.6	16.1	16.8
SYSTEM													
STORAGE 1000 AF	45189	47298	50084	51598	55566	57732	57226	56783	56015	55404	55504	55595	56066
ENERGY GWH	8613	423	611	777	725	924	963	801	693	661	656	752	627
PEAK POWER MW		2234	2275	2293	2337	2355	2347	2341	2318	2244	2268	2297	2337

PRELIMINARY 1992-1993 AOP UPPER QUARTILE RUNOFF - OPTION 1UQ

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK													
ELEV FTMSL	2212.5	2215.4	2217.7	2220.7	2225.2	2226.5	2225.8	2226.8	2227.9	2228.2	2227.4	2226.8	2226.4
DISCH KCFS	8.0	4.5	6.0	8.0	9.0	9.0	9.0	4.8	4.3	6.2	10.0	11.0	10.0
GARRISON													
ELEV FTMSL	1820.5	1821.7	1823.0	1823.9	1830.3	1834.5	1834.7	1834.8	1835.0	1835.1	1834.6	1832.9	1831.2
DISCH KCFS	21.0	17.3	19.0	21.0	23.0	23.0	23.0	16.5	12.4	14.5	20.0	25.0	25.0
OAHE													
ELEV FTMSL	1594.2	1599.1	1601.6	1602.6	1604.8	1604.6	1603.4	1601.8	1601.0	1600.6	1600.8	1601.5	1603.4
DISCH KCFS	15.1	9.5	15.7	20.9	19.2	25.5	28.2	25.5	16.6	16.7	17.4	20.8	16.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	9.5	15.7	20.9	19.2	25.4	28.0	25.2	16.3	16.4	17.2	20.8	16.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	11.2	19.7	23.1	22.9	26.5	28.4	29.2	27.3	25.3	12.2	12.4	12.4
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	14.0	23.2	26.0	26.3	29.1	30.1	30.4	29.4	27.3	13.3	13.8	14.9
SYSTEM													
STORAGE 1000 AF	45188	47498	48935	49983	53229	54596	54166	53789	53220	52695	52747	52842	53114
ENERGY GWH	8035	410	576	728	716	858	908	753	605	584	606	706	587
PEAK POWER MW		2237	2257	2269	2309	2324	2319	2314	2292	2218	2241	2268	2307

```
                                  PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 1M
                                  Elevations & Storages are for Date Shown
                                  Discharge & Energy are Period Values
                                  Date:   08/10/92

                                          1992                                  1993
                    31JUL92     31AUG    30SEP     31OCT     30NOV    31DEC    31JAN     28FEB

FORT PECK -------------
         ELEV FTMSL  2212.4    2211.7   2212.2    2212.5    2212.9   2211.5   2210.4    2209.7
        DISCH KCFS      7.2       6.0      3.1       3.1       3.6      8.0      8.0       8.0

GARRISON --------------
         ELEV FTMSL  1824.9    1824.0   1823.3    1823.2    1822.8   1821.0   1819.3    1818.1
        DISCH KCFS     19.2      18.0     13.2      10.0      11.3     19.0     20.5      20.0

OAHE ------------------
         ELEV FTMSL  1590.0    1589.3   1588.7    1588.5    1589.2   1589.1   1590.4    1591.6
        DISCH KCFS     20.2      19.7     16.1      10.4       7.6     18.1     15.1      15.7

BIG BEND --------------
         ELEV FTMSL  1419.7    1420.5   1420.5    1420.5    1420.5   1420.5   1420.5    1420.5
        DISCH KCFS     21.1      18.7     15.6      10.0       7.3     17.9     15.1      15.7

FORT RANDALL ----------
         ELEV FTMSL  1356.2    1353.2   1345.3    1337.5    1337.5   1344.4   1347.8    1353.0
        DISCH KCFS     21.0      22.9     25.9      18.0       7.3     10.7     11.5       9.0

GAVINS POINT  ---------
         ELEV FTMSL  1205.4    1206.5   1207.0    1207.0    1207.0   1207.0   1207.0    1206.0
        DISCH KCFS     23.9      23.5     26.5      19.6       9.0     12.0     13.0      11.5

SYSTEM ----------------
      STORAGE 1000 AF 45474     44753    43926     43416     43558    43278    43214     43488
       ENERGY GWH      3384       646      538       391       275      545      528       462
         PEAK POWER MW           2098     2075      2039      2004     2120     2134      2177
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                                  PRELIMINARY 1992-1993 AOP MEDIAN RUNOFF - OPTION 1M

                                          1993                                                                                  1994
                    28FEB93     31MAR    30APR     31MAY     30JUN    31JUL    31AUG     30SEP    31OCT     30NOV    31DEC    31JAN     28FEB
FORT PECK -------------
         ELEV FTMSL  2209.7    2211.2   2212.6    2214.7    2218.9   2220.2   2219.4    2219.8   2220.5    2220.3   2219.3   2218.6    2218.3
        DISCH KCFS      8.0       4.0      5.0       8.0       9.0      9.0      9.0       4.7      3.6       6.8      9.5     10.0       9.5

GARRISON --------------
         ELEV FTMSL  1818.1    1820.2   1821.2    1822.2    1827.9   1829.8   1828.9    1829.0   1828.9    1828.6   1827.3   1825.7    1824.7
        DISCH KCFS     20.0      12.4     16.0      20.0      22.0     22.0     22.0      13.4     11.5      14.8     20.0     23.0      22.0

OAHE ------------------
         ELEV FTMSL  1591.6    1594.0   1595.7    1596.5    1599.5   1599.0   1597.4    1594.5   1593.4    1592.8   1593.7   1594.3    1596.6
        DISCH KCFS     15.7       9.0     14.4      21.4      20.8     25.3     27.4      24.4     15.0      15.6     14.9     19.4      12.9

BIG BEND --------------
         ELEV FTMSL  1420.5    1420.5   1420.5    1420.5    1420.5   1420.5   1420.5    1420.5   1420.5    1420.5   1420.5   1420.5    1420.5
        DISCH KCFS     15.7       9.0     14.4      21.4      20.8     25.2     27.1      24.0     14.7      15.3     14.7     19.4      12.9

FORT RANDALL ----------
         ELEV FTMSL  1353.0    1355.2   1355.2    1355.2    1355.2   1355.2   1355.2    1353.5   1345.0    1337.5   1342.7   1349.8    1353.0
        DISCH KCFS      9.0      11.9     20.3      23.2      23.2     26.2     27.4      27.6     25.8      23.6     10.2     11.7       8.8

GAVINS POINT  ---------
         ELEV FTMSL  1206.0    1206.0   1206.0    1206.0    1206.0   1206.0   1206.5    1207.0   1207.0    1207.0   1207.0   1207.0    1206.0
        DISCH KCFS     11.5      13.9     22.8      25.4      25.4     27.2     28.2      28.5     27.5      25.4     12.0     13.0      11.5

SYSTEM ----------------
      STORAGE 1000 AF 43488     45042    45992     46804     49879    50505    49670     48892    48035     47302    47278    47404     47910
       ENERGY GWH      7432       359      524       715       717      826      862       686      545       556      537      635       470
         PEAK POWER MW           2198     2213      2224      2266     2272     2260      2248     2222      2146     2169     2196      2239
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                                        PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 1LQ & 1LD
                                        Elevations & Storages are for Date Shown
                                        Discharge & Energy are Period Values
                                        Date:    08/09/92

                                           1992                          1993
                   31JUL92     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
      ELEV FTMSL    2212.4    2211.4    2211.5    2211.4    2211.5    2209.7    2208.4    2207.3
     DISCH KCFS        7.2       6.0       3.0       3.0       3.5       8.0       8.0       8.0

GARRISON --------------
      ELEV FTMSL    1824.9    1823.5    1822.5    1822.0    1821.4    1819.5    1817.6    1816.3
     DISCH KCFS       19.2      18.0      13.2      10.0      10.0      18.5      20.0      19.0

OAHE ------------------
      ELEV FTMSL    1590.0    1589.0    1588.2    1587.6    1587.8    1587.9    1588.5    1589.6
     DISCH KCFS       20.2      20.4      15.9      11.8       8.2      16.7      17.3      14.6

BIG BEND --------------
      ELEV FTMSL    1419.7    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
     DISCH KCFS       21.1      19.3      15.4      11.3       7.8      16.4      17.3      14.6

FORT RANDALL ----------
      ELEV FTMSL    1356.2    1353.2    1344.6    1337.5    1337.5    1342.7    1347.8    1353.0
     DISCH KCFS       21.0      23.2      26.2      18.3       7.7      11.0      11.8       7.8

GAVINS POINT  ---------
      ELEV FTMSL    1205.4    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
     DISCH KCFS       23.9      23.5      26.5      19.6       9.0      12.0      13.0      10.0

SYSTEM ----------------
  STORAGE 1000 AF    45474     44515     43444     42687     42634     42176     41979     42176
   ENERGY GWH         3369       655       517       427       272       521       548       429
      PEAK POWER MW             2095      2062      2029      1991      2097      2115      2157
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                                        PRELIMINARY 1992-1993 AOP LOWER QUARTILE RUNOFF - OPTION 1LQ

                                           1993                                                                                  1994
                   28FEB93     31MAR     30APR     31MAY     30JUN     31JUL     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
      ELEV FTMSL    2207.3    2208.8    2210.3    2214.3    2216.3    2215.4    2213.2    2212.5    2212.2    2211.3    2209.4    2208.0    2207.5
     DISCH KCFS        8.0       4.0       5.0       7.0       8.5       8.5       8.5       4.9       3.9       6.5       9.0       9.5       9.0

GARRISON --------------
      ELEV FTMSL    1816.3    1818.1    1819.7    1819.8    1823.0    1824.2    1822.9    1822.4    1822.0    1820.6    1819.3    1817.0    1815.5
     DISCH KCFS       19.0      10.0      15.0      19.5      19.5      19.5      19.5      12.1      10.3      16.0      20.0      22.5      22.0

OAHE ------------------
      ELEV FTMSL    1589.6    1590.9    1591.5    1591.4    1593.0    1591.7    1589.5    1586.3    1584.3    1583.5    1583.9    1584.5    1587.2
     DISCH KCFS       14.6      10.7      17.1      22.1      20.6      24.9      27.1      24.5      16.1      16.3      15.8      19.3      11.5

BIG BEND --------------
      ELEV FTMSL    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
     DISCH KCFS       14.6      10.7      17.1      22.1      20.6      24.8      26.7      24.0      15.7      15.8      15.6      19.3      11.5

FORT RANDALL ----------
      ELEV FTMSL    1353.0    1355.2    1355.2    1355.2    1355.2    1355.2    1355.2    1353.5    1345.5    1337.5    1342.7    1349.8    1353.0
     DISCH KCFS        7.8      11.6      19.6      23.3      22.9      25.4      27.0      27.8      26.1      23.6      10.6      11.5       7.4

GAVINS POINT  ---------
      ELEV FTMSL    1206.0    1206.0    1206.0    1206.0    1206.0    1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
     DISCH KCFS       10.0      13.8      22.8      25.4      25.4      27.2      28.2      28.5      27.5      25.4      12.0      13.0      10.0

SYSTEM ----------------
  STORAGE 1000 AF    42174     43347     44155     44787     46364     46201     44952     43798     42546     41377     41146     41005     41399
   ENERGY GWH         7164       355       539       703       677       775       810       663       541       555       526       600       420
      PEAK POWER MW             2171      2183      2187      2210      2207      2189      2172      2141      2058      2077      2100      2142
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                                        PRELIMINARY 1992-1993 AOP LOWER DECILE RUNOFF - OPTION 1LD

                                           1993                                                                                  1994
                   28FEB93     31MAR     30APR     31MAY     30JUN     31JUL     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
      ELEV FTMSL    2207.3    2208.8    2210.3    2211.2    2211.9    2210.6    2208.8    2207.9    2207.4    2206.2    2204.5    2203.2    2202.7
     DISCH KCFS        8.0       4.0       5.0       7.0       7.0       7.0       7.0       4.7       3.8       5.8       8.5       8.5       8.5

GARRISON --------------
      ELEV FTMSL    1816.3    1816.8    1818.5    1818.3    1821.4    1822.4    1820.9    1820.2    1819.5    1817.8    1816.0    1813.6    1812.0
     DISCH KCFS       19.0      11.5      15.0      21.5      19.5      19.5      19.5      13.0      11.1      17.0      20.0      22.0      21.0

OAHE ------------------
      ELEV FTMSL    1589.6    1591.5    1590.7    1590.5    1590.3    1588.7    1585.9    1582.0    1579.7    1579.6    1580.0    1580.5    1582.9
     DISCH KCFS       14.6      10.6      18.9      23.1      22.2      26.4      28.2      27.0      18.3      14.6      16.9      20.5      11.8

BIG BEND --------------
      ELEV FTMSL    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
     DISCH KCFS       14.6      10.6      18.9      23.1      22.2      26.3      27.8      26.5      17.8      14.2      16.7      20.5      11.8

FORT RANDALL ----------
      ELEV FTMSL    1353.0    1355.2    1355.2    1355.2    1355.2    1355.2    1355.2    1353.5    1346.6    1337.5    1342.7    1349.8    1353.0
     DISCH KCFS        7.8      11.6      20.4      23.4      23.3      26.2      27.5      27.8      25.9      23.8      10.5      11.6       7.4

GAVINS POINT  ---------
      ELEV FTMSL    1206.0    1206.0    1206.0    1206.0    1206.0    1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
     DISCH KCFS       10.0      13.8      22.8      25.4      25.4      27.2      28.2      28.5      27.5      25.4      12.0      13.0      10.0

SYSTEM ----------------
  STORAGE 1000 AF    42176     43179     43649     43684     44541     44193     42831     41484     40203     38967     38676     38511     38846
   ENERGY GWH         7228       366       565       729       681       777       804       690       565       533       525       591       404
      PEAK POWER MW             2170      2174      2173      2185      2178      2157      2136      2108      2021      2038      2060      2101
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PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 4M

Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 08/09/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.4	2211.7	2212.2	2212.5	2212.9	2211.5	2210.4	2209.7
DISCH KCFS	7.2	6.0	3.1	3.1	3.6	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.9	1824.0	1823.3	1823.2	1822.8	1821.0	1819.3	1818.1
DISCH KCFS	19.2	18.0	13.2	10.0	11.3	19.0	20.5	20.0
OAHE								
ELEV FTMSL	1590.0	1589.3	1588.7	1588.5	1589.2	1589.1	1590.4	1591.6
DISCH KCFS	20.2	19.7	16.1	10.4	7.6	18.1	15.1	15.7
BIG BEND								
ELEV FTMSL	1419.7	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	18.7	15.6	10.0	7.3	17.9	15.1	15.7
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.3	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	21.0	22.9	25.9	18.0	7.3	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1205.4	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45474	44753	43926	43416	43558	43278	43214	43488
ENERGY GWH	3384	646	538	391	275	545	528	462
PEAK POWER MW		2098	2075	2039	2004	2120	2134	2177

PRELIMINARY 1992-1993 AOP MEDIAN RUNOFF - OPTION 4M

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK													
ELEV FTMSL	2209.7	2211.2	2212.6	2214.7	2218.9	2220.2	2219.4	2220.0	2220.9	2221.0	2220.2	2219.5	2219.3
DISCH KCFS	8.0	4.0	5.0	8.0	9.0	9.0	9.0	4.0	3.0	6.0	9.0	10.0	9.0
GARRISON													
ELEV FTMSL	1818.1	1820.2	1821.5	1822.7	1828.5	1830.7	1829.9	1830.1	1830.0	1829.6	1828.2	1826.7	1825.7
DISCH KCFS	20.0	12.4	15.0	19.0	21.0	21.0	21.0	12.3	10.6	14.8	20.0	23.0	22.0
OAHE													
ELEV FTMSL	1591.6	1594.0	1595.5	1596.1	1598.9	1598.2	1596.2	1593.8	1592.9	1593.7	1594.4	1595.1	1597.3
DISCH KCFS	15.7	9.0	14.4	21.4	20.8	25.3	27.4	21.5	13.2	9.7	15.2	19.4	12.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	9.0	14.4	21.4	20.8	25.2	27.1	21.1	12.8	9.4	15.0	19.4	12.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1351.4	1340.6	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	9.0	11.9	20.3	23.2	23.2	26.2	27.4	27.6	25.8	12.9	10.5	11.7	8.8
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	13.9	22.8	25.4	25.4	27.2	28.2	28.5	27.5	15.0	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	43488	45042	45996	46808	49883	50510	49675	48906	48047	47953	47904	48026	48537
ENERGY GWH	7149	359	516	707	709	818	853	634	506	404	540	638	468
PEAK POWER MW		2198	2213	2223	2265	2270	2258	2247	2204	2155	2177	2205	2247

PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 4LQ & 4LD
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 08/09/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.4	2211.4	2211.5	2211.4	2211.5	2209.7	2208.4	2207.3
DISCH KCFS	7.2	6.0	3.0	3.0	3.5	8.0	8.0	8.0
GARRISON --------------								
ELEV FTMSL	1824.9	1823.5	1822.5	1822.0	1821.4	1819.5	1817.6	1816.3
DISCH KCFS	19.2	18.0	13.2	10.0	10.0	18.5	20.0	19.0
OAHE ------------------								
ELEV FTMSL	1590.0	1589.0	1588.2	1587.6	1587.8	1587.9	1588.5	1589.6
DISCH KCFS	20.2	20.4	15.9	11.8	8.2	16.7	17.3	14.6
BIG BEND --------------								
ELEV FTMSL	1419.7	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	19.3	15.4	11.3	7.8	16.4	17.3	14.6
FORT RANDALL ----------								
ELEV FTMSL	1356.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	21.0	23.2	26.2	18.3	7.7	11.0	11.8	7.8
GAVINS POINT ---------								
ELEV FTMSL	1205.4	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------								
STORAGE 1000 AF	45474	44515	43444	42687	42634	42176	41979	42176
ENERGY GWH	3369	655	517	427	272	521	548	429
PEAK POWER MW		2095	2062	2029	1991	2097	2115	2157

PRELIMINARY 1992-1993 AOP LOWER QUARTILE RUNOFF - OPTION 4LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2207.3	2208.8	2210.3	2214.3	2216.5	2215.7	2213.7	2213.4	2213.4	2212.8	2211.1	2209.9	2209.6
DISCH KCFS	8.0	4.0	5.0	7.0	8.0	8.0	8.0	3.8	3.1	5.8	8.5	9.0	8.5
GARRISON --------------													
ELEV FTMSL	1816.3	1818.1	1819.7	1819.6	1823.0	1824.3	1823.2	1822.5	1822.0	1821.3	1820.1	1818.4	1817.4
DISCH KCFS	19.0	10.0	15.0	20.0	18.5	18.5	18.5	11.7	9.9	12.3	19.0	20.0	19.0
OAHE ------------------													
ELEV FTMSL	1589.6	1590.9	1591.5	1591.5	1592.9	1591.4	1588.9	1587.3	1586.6	1587.0	1587.0	1587.0	1588.9
DISCH KCFS	14.6	10.7	17.1	22.1	20.6	24.9	27.1	17.7	10.6	8.0	16.1	19.3	11.5
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	10.7	17.1	22.1	20.6	24.8	26.7	17.2	10.2	7.6	15.9	19.3	11.5
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1348.4	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	11.6	19.6	23.3	22.9	25.4	27.0	27.8	22.3	6.9	10.9	11.5	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	13.8	22.8	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	42174	43347	44155	44785	46374	46211	44962	43812	42791	42625	42357	42224	42620
ENERGY GWH	6627	355	539	707	665	762	797	569	427	305	523	580	398
PEAK POWER MW		2171	2183	2187	2210	2206	2187	2173	2118	2080	2097	2119	2160

PRELIMINARY 1992-1993 AOP LOWER DECILE RUNOFF - OPTION 4LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2207.3	2209.2	2210.7	2211.6	2212.2	2211.0	2209.1	2208.5	2208.3	2207.6	2206.2	2205.4	2205.4
DISCH KCFS	8.0	3.0	5.0	7.0	7.0	7.0	7.0	3.9	3.2	4.5	7.5	7.5	7.0
GARRISON --------------													
ELEV FTMSL	1816.3	1816.6	1818.2	1818.0	1821.6	1822.9	1821.8	1821.1	1820.5	1819.4	1817.7	1815.5	1814.1
DISCH KCFS	19.0	11.5	15.0	21.5	18.0	18.0	18.0	12.1	10.2	13.3	19.0	20.0	19.0
OAHE ------------------													
ELEV FTMSL	1589.6	1591.5	1590.7	1590.5	1590.0	1588.0	1585.5	1584.4	1583.0	1583.6	1583.6	1583.6	1585.4
DISCH KCFS	14.6	10.6	18.9	23.1	22.2	26.4	25.4	15.2	14.6	8.0	17.2	20.5	11.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	10.6	18.9	23.1	22.2	26.3	25.0	14.7	14.1	7.5	17.0	20.5	11.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	11.6	20.4	23.4	23.3	26.2	27.5	27.8	17.7	7.3	10.8	11.6	7.4
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	13.8	22.8	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM ----------------													
STORAGE 1000 AF	42176	43190	43649	43684	44548	44200	42838	41499	40718	40475	40151	39991	40331
ENERGY GWH	6586	357	564	728	669	764	758	536	437	298	519	573	383
PEAK POWER MW		2169	2174	2173	2184	2177	2159	2116	2088	2049	2065	2086	2125

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - OPTIONS 5UD & 5UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 08/09/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.4	2212.0	2212.2	2213.1	2213.9	2213.1	2212.4	2212.5
DISCH KCFS	7.2	6.0	4.5	3.1	3.7	8.0	9.0	8.0
GARRISON --------------								
ELEV FTMSL	1824.9	1824.4	1824.2	1824.5	1824.2	1822.8	1821.5	1820.5
DISCH KCFS	19.2	18.0	14.0	10.8	13.0	19.0	21.0	21.0
OAHE ------------------								
ELEV FTMSL	1590.0	1589.6	1589.8	1589.7	1591.1	1591.6	1592.6	1594.2
DISCH KCFS	20.2	18.9	14.4	11.2	6.7	15.9	16.7	15.1
BIG BEND --------------								
ELEV FTMSL	1419.7	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	17.9	14.5	10.3	6.8	15.7	16.7	15.1
FORT RANDALL ----------								
ELEV FTMSL	1356.2	1353.2	1344.8	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	21.0	22.4	25.6	17.8	6.9	10.4	11.3	8.6
GAVINS POINT ---------								
ELEV FTMSL	1205.4	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ----------------								
STORAGE 1000 AF	45474	44984	44372	44159	44546	44502	44654	45189
ENERGY GWH	3407	637	545	393	283	520	564	466
PEAK POWER MW		2102	2082	2050	2019	2134	2156	2203

PRELIMINARY 1992-1993 AOP UPPER DECILE RUNOFF - OPTION 5UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2212.5	2215.0	2217.9	2221.8	2228.3	2232.3	2232.3	2233.1	2233.8	2233.9	2233.3	2232.4	2232.6
DISCH KCFS	8.0	4.0	5.0	6.0	9.5	9.5	9.5	5.1	4.8	6.5	9.0	10.0	10.0
GARRISON --------------													
ELEV FTMSL	1820.5	1822.6	1826.8	1828.6	1836.1	1841.0	1840.9	1839.5	1838.6	1838.4	1837.6	1836.5	1836.0
DISCH KCFS	21.0	14.5	20.0	22.0	23.0	23.0	23.0	22.8	17.1	15.6	20.0	24.0	23.0
OAHE ------------------													
ELEV FTMSL	1594.2	1599.1	1604.1	1605.2	1607.0	1606.3	1604.6	1604.4	1604.4	1604.0	1604.5	1604.9	1606.0
DISCH KCFS	15.1	4.2	12.9	22.6	19.6	28.9	30.9	28.3	20.2	20.2	19.9	21.8	17.8
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	4.2	12.9	22.6	19.6	28.8	30.6	28.0	19.9	20.0	19.8	21.8	17.8
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	5.9	15.8	24.4	22.5	29.3	31.0	31.0	30.1	27.6	14.8	14.8	14.8
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.0	18.2	26.3	26.9	31.2	32.2	32.5	31.5	29.4	16.1	16.4	17.1
SYSTEM ----------------													
STORAGE 1000 AF	45189	47655	50696	52208	56138	58278	57746	57253	56476	55859	55937	56018	56472
ENERGY GWH	8441	270	508	757	734	940	979	869	726	661	658	732	609
PEAK POWER MW		2239	2284	2300	2344	2361	2353	2349	2327	2252	2275	2303	2342

PRELIMINARY 1992-1993 AOP UPPER QUARTILE RUNOFF - OPTION 5UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2212.5	2215.6	2218.2	2221.9	2226.3	2227.7	2226.9	2228.0	2229.2	2229.6	2229.0	2228.7	2228.7
DISCH KCFS	8.0	4.0	5.0	[illegible]0	9.0	9.0	9.0	4.3	3.9	6.3	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1820.5	1822.3	1823.6	1824.6	1831.0	1835.4	1835.8	1836.3	1836.6	1836.7	1836.0	1834.5	1833.4
DISCH KCFS	21.0	14.5	18.0	19.0	22.0	22.0	22.0	14.0	11.7	14.3	20.0	23.0	22.0
OAHE ------------------													
ELEV FTMSL	1594.2	1599.8	1603.0	1603.6	1605.8	1605.7	1604.7	1603.1	1602.5	1602.4	1602.9	1603.3	1605.3
DISCH KCFS	15.1	4.1	11.0	20.4	18.3	23.5	26.3	23.6	14.7	14.8	16.1	20.1	13.4
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	4.1	11.0	20.4	18.3	23.5	26.1	23.3	14.4	14.5	15.9	20.1	13.4
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	5.8	15.0	22.6	22.0	24.6	26.5	27.3	25.4	23.4	10.9	11.7	8.9
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.0	18.2	25.4	25.4	27.2	28.2	28.5	27.5	25.4	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	45189	47858	49564	50656	53932	55417	55101	54842	54379	53955	54094	54242	54711
ENERGY GWH	7310	268	463	684	691	811	862	691	557	551	572	669	491
PEAK POWER MW		2243	2267	2278	2317	2334	2331	2327	2307	2234	2258	2285	2326

PRELIMINARY 1992-1993 AOP BASIC FORECAST - OPTION 5M

Elevations & Storages are for Data Shown
Discharge & Energy are Period Values
Date: 08/10/92

			1992				1993	
	31JUL92	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.4	2211.7	2212.2	2212.5	2212.9	2211.5	2210.4	2209.7
DISCH KCFS	7.2	6.0	3.1	3.1	3.6	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.9	1824.0	1823.3	1823.2	1822.8	1821.0	1819.3	1818.1
DISCH KCFS	19.2	18.0	13.2	10.0	11.3	19.0	20.5	20.0
OAHE								
ELEV FTMSL	1590.0	1589.3	1588.7	1588.5	1589.2	1589.1	1590.4	1591.6
DISCH KCFS	20.2	19.7	16.1	10.4	7.6	18.1	15.1	15.7
BIG BEND								
ELEV FTMSL	1419.7	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	18.7	15.6	10.0	7.3	17.9	15.1	15.7
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.3	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	21.0	22.9	25.9	18.0	7.3	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1205.4	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45474	44753	43926	43416	43558	43278	43214	43488
ENERGY GWH	3384	646	538	391	275	545	528	462
PEAK POWER MW		2098	2075	2039	2004	2120	2134	2177

PRELIMINARY 1992-1993 AOP MEDIAN RUNOFF - OPTION 5M

			1993									1994	
	28FEB93	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	31JAN	28FEB
FORT PECK													
ELEV FTMSL	2209.7	2211.2	2212.8	2215.2	2219.8	2221.3	2220.9	2221.4	2222.2	2222.1	2221.2	2220.5	2220.3
DISCH KCFS	8.0	4.0	4.5	7.0	8.0	8.0	8.0	4.4	3.3	6.8	9.0	10.0	9.0
GARRISON													
ELEV FTMSL	1818.1	1820.4	1821.4	1822.4	1828.2	1830.1	1829.4	1829.6	1829.6	1829.6	1828.2	1827.0	1826.3
DISCH KCFS	20.0	11.5	16.0	19.0	20.5	20.5	20.5	12.1	10.4	13.8	20.0	21.5	20.5
OAHE													
ELEV FTMSL	1591.6	1595.0	1597.6	1598.2	1600.8	1600.0	1598.0	1595.6	1594.6	1595.1	1595.9	1596.2	1598.1
DISCH KCFS	15.7	3.8	10.2	21.5	20.8	25.3	27.4	21.5	13.2	9.7	15.2	19.4	12.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	3.8	10.2	21.5	20.8	25.2	27.1	21.1	12.8	9.4	15.0	19.4	12.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.3	1355.3	1355.3	1355.3	1355.3	1355.3	1351.5	1340.7	1337.6	1342.8	1349.9	1353.1
DISCH KCFS	9.0	6.6	16.0	23.4	23.2	26.2	27.4	27.6	25.8	12.9	10.5	11.7	8.8
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	9.0	18.2	25.4	25.4	27.2	28.2	28.5	27.5	15.0	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	43488	45369	46577	47391	50469	51094	50257	49470	48609	48505	48465	48593	49104
ENERGY GWH	6895	242	433	703	697	806	841	636	507	403	541	627	458
PEAK POWER MW		2204	2224	2233	2275	2279	2267	2256	2213	2164	2186	2213	2255

PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - OPTIONS 5LQ & 5LD

Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 08/09/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.4	2211.4	2211.5	2211.4	2211.5	2209.7	2208.4	2207.3
DISCH KCFS	7.2	6.0	3.0	3.0	3.5	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.9	1823.5	1822.5	1822.0	1821.4	1819.5	1817.6	1816.3
DISCH KCFS	19.2	18.0	13.2	10.0	10.0	18.5	20.0	19.0
OAHE								
ELEV FTMSL	1590.0	1589.0	1588.2	1587.6	1587.8	1587.9	1588.5	1589.6
DISCH KCFS	20.2	20.4	15.9	11.8	8.2	16.7	17.3	14.6
BIG BEND								
ELEV FTMSL	1419.7	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	19.3	15.4	11.3	7.8	16.4	17.3	14.6
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1344.6	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	21.0	23.2	26.2	18.3	7.7	11.0	11.8	7.8
GAVINS POINT								
ELEV FTMSL	1205.4	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	10.0
SYSTEM								
STORAGE 1000 AF	45474	44515	43444	42687	42634	42176	41979	42176
ENERGY GWH	3369	655	517	427	272	521	548	429
PEAK POWER MW		2095	2062	2029	1991	2097	2115	2157

PRELIMINARY 1992-1993 AOP LOWER QUARTILE RUNOFF - OPTION 5LQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2207.3	2209.0	2210.9	2215.2	2217.3	2216.6	2214.6	2214.5	2214.5	2213.6	2212.0	2210.7	2210.6
DISCH KCFS	8.0	3.5	4.0	6.0	8.0	8.0	8.0	3.1	3.1	6.5	8.5	9.0	8.0
GARRISON													
ELEV FTMSL	1816.3	1818.0	1819.4	1819.2	1822.6	1824.1	1823.1	1822.6	1822.0	1821.5	1820.5	1819.1	1818.2
DISCH KCFS	19.0	10.0	15.0	19.5	18.0	18.0	18.0	10.1	10.1	12.6	18.0	19.0	18.0
OAHE													
ELEV FTMSL	1589.6	1592.2	1593.8	1593.6	1594.9	1593.3	1590.7	1588.8	1588.1	1588.6	1588.3	1588.1	1589.7
DISCH KCFS	14.6	5.4	12.8	22.3	20.6	24.9	27.1	17.7	10.6	8.0	16.1	19.3	11.5
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	5.4	12.8	22.3	20.6	24.8	26.7	17.2	10.2	7.6	15.9	19.3	11.5
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1348.4	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	15.4	23.4	22.9	25.4	27.0	27.8	22.3	6.9	10.9	11.5	7.4
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	18.2	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	42174	43677	44744	45367	46946	46782	45531	44390	43350	43172	42919	42785	43187
ENERGY GWH	6377	242	444	699	663	761	795	551	429	314	516	574	388
PEAK POWER MW		2178	2194	2198	2220	2216	2197	2183	2127	2089	2106	2128	2169

PRELIMINARY 1992-1993 AOP LOWER DECILE RUNOFF - OPTION 5LD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2207.3	2209.2	2211.0	2212.3	2212.9	2211.7	2209.9	2209.6	2209.4	2208.6	2207.4	2206.4	2206.4
DISCH KCFS	8.0	3.0	4.0	6.0	7.0	7.0	7.0	3.1	3.1	4.8	7.0	8.0	7.0
GARRISON													
ELEV FTMSL	1816.3	1817.0	1818.4	1818.1	1821.5	1822.9	1821.8	1821.2	1820.5	1819.7	1818.1	1816.3	1815.1
DISCH KCFS	19.0	10.0	15.0	21.0	18.0	18.0	18.0	11.0	10.1	12.6	18.0	19.0	18.0
OAHE													
ELEV FTMSL	1589.6	1592.4	1592.7	1592.3	1591.8	1589.8	1587.3	1586.1	1584.6	1585.0	1584.8	1584.5	1586.1
DISCH KCFS	14.6	5.4	14.7	23.2	22.2	26.4	25.4	15.2	14.6	8.0	17.2	20.5	11.8
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	14.6	5.4	14.7	23.2	22.2	26.3	25.0	14.7	14.1	7.5	17.0	20.5	11.8
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.2	1341.7	1337.5	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	7.8	6.4	16.2	23.5	23.3	26.2	27.5	27.8	17.7	7.3	10.8	11.6	7.4
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	10.0	9.0	18.2	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0	13.0	10.0
SYSTEM													
STORAGE 1000 AF	42176	43514	44237	44266	45117	44769	43404	42075	41278	41042	40716	40545	40891
ENERGY GWH	6336	236	470	720	671	767	760	522	436	296	509	572	377
PEAK POWER MW		2176	2185	2183	2194	2187	2170	2126	2098	2058	2074	2094	2134

PRELIMINARY 1992-1993 AOP 120 PERCENT FORECAST - MODIFIED OPTIONS 9UD & 9UQ
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 08/09/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK -------------								
ELEV FTMSL	2212.4	2212.0	2212.2	2213.1	2213.9	2213.1	2212.4	2212.5
DISCH KCFS	7.2	6.0	4.5	3.1	3.7	8.0	9.0	8.0
GARRISON --------------								
ELEV FTMSL	1824.9	1824.4	1824.2	1824.5	1824.2	1822.8	1821.5	1820.5
DISCH KCFS	19.2	18.0	14.0	10.8	13.0	19.0	21.0	21.0
OAHE ------------------								
ELEV FTMSL	1590.0	1589.6	1589.8	1589.7	1591.1	1591.6	1592.6	1594.2
DISCH KCFS	20.2	18.9	14.4	11.2	6.7	15.9	16.7	15.1
BIG BEND --------------								
ELEV FTMSL	1419.7	1420.5	1420.1	1420.7	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	17.9	14.5	10.3	6.8	15.7	16.7	15.1
FORT RANDALL ----------								
ELEV FTMSL	1356.2	1353.2	1344.8	1337.5	1337.5	1342.7	1347.8	1353.0
DISCH KCFS	21.0	22.4	25.6	17.8	6.9	10.4	11.3	8.6
GAVINS POINT ---------								
ELEV FTMSL	1205.4	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM ----------------								
STORAGE 1000 AF	45474	44984	44372	44159	44546	44502	44654	45189
ENERGY GWH	3407	637	545	393	283	520	564	466
PEAK POWER MW		2102	2082	2050	2019	2134	2156	2203

PRELIMINARY 1992-1993 AOP UPPER DECILE RUNOFF - MODIFIED OPTION 9UD

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2212.5	2214.9	2217.7	2221.3	2228.1	2232.5	2232.8	2234.0	2235.0	2235.1	2234.5	2233.7	2234.1
DISCH KCFS	8.0	4.5	5.0	7.0	8.5	8.5	8.5	3.6	3.6	6.3	9.0	10.0	9.0
GARRISON --------------													
ELEV FTMSL	1820.5	1823.0	1827.7	1830.0	1837.5	1842.1	1842.0	1841.4	1840.7	1840.1	1839.3	1838.2	1837.6
DISCH KCFS	21.0	13.0	18.0	20.0	22.5	22.5	22.5	16.7	14.7	17.8	20.0	24.0	23.0
OAHE ------------------													
ELEV FTMSL	1594.2	1597.6	1601.5	1602.4	1604.6	1604.9	1604.8	1604.9	1605.2	1605.9	1606.3	1606.5	1607.5
DISCH KCFS	15.1	9.4	17.1	21.3	17.6	23.4	22.6	21.0	16.3	16.7	20.3	22.3	18.2
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	9.4	17.1	21.3	17.6	23.3	22.3	20.7	16.0	16.4	20.1	22.3	18.2
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	11.1	20.0	23.0	20.4	23.8	22.7	23.8	26.2	24.0	15.2	15.2	15.2
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	13.7	22.8	25.1	24.9	25.8	24.0	25.2	27.5	25.8	16.4	16.8	17.5
SYSTEM ----------------													
STORAGE 1000 AF	45189	47338	50131	51718	55782	58261	58237	58200	57641	57210	57260	57317	57759
ENERGY GWH	7858	372	580	719	677	808	791	654	613	617	670	745	611
PEAK POWER MW		2232	2273	2291	2336	2358	2358	2359	2339	2269	2291	2318	2357

PRELIMINARY 1992-1993 AOP UPPER QUARTILE RUNOFF - MODIFIED OPTION 9UQ

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK -------------													
ELEV FTMSL	2212.5	2215.6	2218.2	2221.5	2226.3	2228.0	2227.6	2228.6	2229.8	2230.4	2229.8	2229.5	2229.2
DISCH KCFS	8.0	4.0	5.0	7.0	8.0	8.0	8.0	4.3	3.9	5.5	9.0	10.0	10.0
GARRISON --------------													
ELEV FTMSL	1820.5	1822.9	1824.4	1825.6	1832.0	1836.2	1836.4	1837.1	1837.6	1837.0	1836.2	1834.6	1833.5
DISCH KCFS	21.0	12.0	17.0	19.0	21.5	21.5	21.5	12.8	10.7	17.8	20.0	24.0	22.0
OAHE ------------------													
ELEV FTMSL	1594.2	1598.1	1600.2	1600.9	1603.2	1603.4	1603.1	1601.9	1601.1	1601.7	1602.2	1602.8	1604.8
DISCH KCFS	15.1	9.4	15.3	19.9	17.8	22.1	22.0	20.3	14.8	14.8	16.1	20.1	13.4
BIG BEND --------------													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.1	9.4	15.3	19.9	17.8	22.0	21.8	20.0	14.5	14.5	15.9	20.1	13.4
FORT RANDALL ----------													
ELEV FTMSL	1353.0	1355.0	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.1	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	8.6	11.0	19.3	22.2	21.5	23.2	22.2	24.0	25.5	23.4	10.9	11.7	8.9
GAVINS POINT ---------													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	13.8	22.8	25.1	24.9	25.8	24.0	25.2	27.5	25.4	12.0	13.0	11.5
SYSTEM ----------------													
STORAGE 1000 AF	45189	47547	48990	50095	53423	54997	54945	54875	54404	53981	54115	54257	54721
ENERGY GWH	7255	359	543	683	666	764	755	612	549	574	572	677	500
PEAK POWER MW		2236	2256	2267	2308	2325	2326	2324	2303	2232	2256	2283	2325

PRELIMINARY 1992-1993 AOP BASIC FORECAST - MODIFIED OPTION 9M
Elevations & Storages are for Date Shown
Discharge & Energy are Period Values
Date: 08/09/92

	31JUL92	31AUG	1992 30SEP	31OCT	30NOV	31DEC	1993 31JAN	28FEB
FORT PECK								
ELEV FTMSL	2212.4	2211.7	2212.2	2212.5	2212.9	2211.5	2210.4	2209.7
DISCH KCFS	7.2	6.0	3.1	3.1	3.6	8.0	8.0	8.0
GARRISON								
ELEV FTMSL	1824.9	1824.0	1823.3	1823.2	1822.8	1821.0	1819.3	1818.1
DISCH KCFS	19.2	18.0	13.2	10.0	11.3	19.0	20.5	20.0
OAHE								
ELEV FTMSL	1590.0	1589.3	1588.7	1588.5	1589.2	1589.1	1590.4	1591.6
DISCH KCFS	20.2	19.7	16.1	10.4	7.6	18.1	15.1	15.7
BIG BEND								
ELEV FTMSL	1419.7	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	21.1	18.7	15.6	10.0	7.3	17.9	15.1	15.7
FORT RANDALL								
ELEV FTMSL	1356.2	1353.2	1345.3	1337.5	1337.5	1344.4	1347.8	1353.0
DISCH KCFS	21.0	22.9	25.9	18.0	7.3	10.7	11.5	9.0
GAVINS POINT								
ELEV FTMSL	1205.4	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	23.9	23.5	26.5	19.6	9.0	12.0	13.0	11.5
SYSTEM								
STORAGE 1000 AF	45474	44753	43926	43416	43558	43278	43214	43488
ENERGY GWH	3384	646	538	391	275	545	528	462
PEAK POWER MW		2098	2075	2039	2004	2120	2134	2177

PRELIMINARY 1992-1993 AOP MEDIAN RUNOFF - MODIFIED OPTION 9M

	28FEB93	31MAR	1993 30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	30NOV	31DEC	1994 31JAN	28FEB
FORT PECK													
ELEV FTMSL	2209.7	2211.2	2212.6	2215.0	2219.6	2221.2	2220.7	2221.1	2221.9	2221.7	2220.6	2219.9	2219.4
DISCH KCFS	8.0	4.0	5.0	7.0	8.0	8.0	8.0	4.6	3.5	6.8	10.0	10.0	10.0
GARRISON													
ELEV FTMSL	1818.1	1820.2	1821.2	1822.4	1828.2	1830.1	1829.4	1829.6	1829.6	1829.4	1828.2	1826.4	1825.4
DISCH KCFS	20.0	12.4	16.0	18.5	20.5	20.5	20.5	12.3	10.6	14.8	20.0	24.0	23.0
OAHE													
ELEV FTMSL	1591.6	1594.0	1595.7	1596.3	1599.1	1598.5	1597.5	1595.2	1593.8	1593.2	1594.0	1594.9	1597.4
DISCH KCFS	15.7	9.0	14.4	21.1	20.3	23.8	23.1	21.2	15.1	15.6	14.9	19.4	12.9
BIG BEND													
ELEV FTMSL	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5	1420.5
DISCH KCFS	15.7	9.0	14.4	21.1	20.3	23.7	22.8	20.7	14.8	15.3	14.7	19.4	12.9
FORT RANDALL													
ELEV FTMSL	1353.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1342.7	1349.8	1353.0
DISCH KCFS	9.0	11.9	20.3	22.9	22.7	24.8	23.1	24.4	25.9	23.6	10.2	11.7	8.8
GAVINS POINT													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.0	1207.0	1207.0	1207.0	1207.0	1206.0
DISCH KCFS	11.5	13.9	22.8	25.1	24.9	25.8	24.0	25.2	27.5	25.4	12.0	13.0	11.5
SYSTEM													
STORAGE 1000 AF	43488	45042	45992	46840	49945	50660	50087	49491	48624	47884	47853	47981	48482
ENERGY GWH	7159	359	524	687	685	774	750	610	539	558	544	646	484
PEAK POWER MW		2198	2213	2223	2266	2271	2264	2255	2229	2153	2176	2203	2247

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                                                  PRELIMINARY 1992-1993 AOP 80 PERCENT FORECAST - MODIFIED OPTIONS 9LQ & 9LD
                                                  Elevations & Storages are for Date Shown
                                                  Discharge & Energy are Period Values
                                                  Date:    08/09/92

                                              1992                                1993
                           31JUL92     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
        ELEV FTMSL          2212.4    2211.4    2211.5    2211.4    2211.5    2209.7    2208.4    2207.3
       DISCH KCFS              7.2       6.0       3.0       3.0       3.5       8.0       8.0       8.0

GARRISON --------------
        ELEV FTMSL          1824.9    1823.5    1822.5    1822.0    1821.4    1819.5    1817.6    1816.3
       DISCH KCFS             19.2      18.0      13.2      10.0      10.0      18.5      20.0      19.0

OAHE ------------------
        ELEV FTMSL          1590.0    1589.0    1588.2    1587.6    1587.8    1587.9    1588.5    1589.6
       DISCH KCFS             20.2      20.4      15.9      11.8       8.2      16.7      17.3      14.6

BIG BEND --------------
        ELEV FTMSL          1419.7    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
       DISCH KCFS             21.1      19.3      15.4      11.3       7.8      16.4      17.3      14.6

FORT RANDALL ----------
        ELEV FTMSL          1356.2    1353.2    1344.6    1337.5    1337.5    1342.7    1347.8    1353.0
       DISCH KCFS             21.0      23.2      26.2      18.3       7.7      11.0      11.8       7.8

GAVINS POINT  ---------
        ELEV FTMSL          1205.4    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
       DISCH KCFS             23.9      23.5      26.5      19.6       9.0      12.0      13.0      10.0

SYSTEM ----------------
     STORAGE 1000 AF         45474     44515     43444     42687     42634     42176     41979     42176
      ENERGY GWH              3369       655       517       427       272       521       548       429
         PEAK POWER MW                  2095      2062      2029      1991      2097      2115      2157
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                                                  PRELIMINARY 1992-1993 AOP LOWER QUARTILE RUNOFF - MODIFIED OPTION 9LQ

                                              1993                                                                                    1994
                           28FEB93     31MAR     30APR     31MAY     30JUN     31JUL     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
        ELEV FTMSL          2207.3    2208.8    2210.3    2214.3    2216.5    2215.7    2213.7    2213.5    2213.5    2212.6    2210.8    2209.1    2208.3
       DISCH KCFS              8.0       4.0       5.0       7.0       8.0       8.0       8.0       3.6       3.0       6.5       9.0      10.0      10.0

GARRISON --------------
        ELEV FTMSL          1816.3    1818.1    1819.7    1819.8    1823.0    1824.2    1822.9    1822.2    1821.6    1820.5    1819.2    1817.4    1816.5
       DISCH KCFS             19.0      10.0      15.0      19.5      19.0      19.0      19.0      11.8      10.0      14.8      20.0      21.0      20.0

OAHE ------------------
        ELEV FTMSL          1589.6    1590.9    1591.5    1591.4    1593.1    1592.0    1590.8    1588.4    1586.3    1585.2    1585.6    1585.8    1587.9
       DISCH KCFS             14.6      10.7      17.1      21.8      20.1      23.5      22.8      21.3      16.2      16.3      15.8      19.3      11.5

BIG BEND --------------
        ELEV FTMSL          1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
       DISCH KCFS             14.6      10.7      17.1      21.8      20.1      23.4      22.4      20.8      15.8      15.8      15.6      19.3      11.5

FORT RANDALL ----------
        ELEV FTMSL          1353.0    1355.2    1355.2    1355.2    1355.2    1355.2    1355.2    1353.5    1345.5    1337.5    1342.7    1349.8    1353.0
       DISCH KCFS              7.8      11.6      19.6      23.0      22.4      24.0      22.7      24.6      26.2      23.6      10.6      11.5       7.4

GAVINS POINT  ---------
        ELEV FTMSL          1206.0    1206.0    1206.0    1206.0    1206.0    1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
       DISCH KCFS             10.0      13.8      22.8      25.1      24.9      25.8      24.0      25.2      27.5      25.4      12.0      13.0      10.0

SYSTEM ----------------
     STORAGE 1000 AF         42174     43347     44155     44806     46421     46345     45359     44403     43139     41966     41724     41585     41976
      ENERGY GWH              6905       355       539       697       659       738       714       586       533       547       528       594       415
         PEAK POWER MW                  2171      2183      2188      2211      2209      2196      2182      2152      2068      2086      2109      2151
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                                                  PRELIMINARY 1992-1993 AOP LOWER DECILE RUNOFF - MODIFIED OPTION 9LD

                                              1993                                                                                    1994
                           28FEB93     31MAR     30APR     31MAY     30JUN     31JUL     31AUG     30SEP     31OCT     30NOV     31DEC     31JAN     28FEB

FORT PECK -------------
        ELEV FTMSL          2207.3    2209.2    2211.0    2212.5    2212.8    2211.2    2209.1    2208.6    2208.5    2207.3    2205.7    2204.3    2204.0
       DISCH KCFS              8.0       3.0       4.0       5.5       8.0       8.0       7.5       3.7       3.0       5.8       8.0       9.0       8.0

GARRISON --------------
        ELEV FTMSL          1816.3    1816.6    1818.0    1817.6    1821.0    1822.4    1821.1    1820.5    1819.8    1818.1    1816.3    1814.1    1812.7
       DISCH KCFS             19.0      11.5      15.0      21.0      19.0      19.0      19.0      12.0      10.2      16.8      20.0      21.0      20.0

OAHE ------------------
        ELEV FTMSL          1589.6    1591.5    1590.7    1590.4    1590.3    1588.9    1587.0    1583.8    1581.3    1581.1    1581.5    1581.7    1583.9
       DISCH KCFS             14.6      10.6      18.9      22.8      21.7      25.0      23.9      23.7      18.4      14.6      16.9      20.5      11.8

BIG BEND --------------
        ELEV FTMSL          1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5    1420.5
       DISCH KCFS             14.6      10.6      18.9      22.8      21.7      24.9      23.5      23.2      17.9      14.2      16.7      20.5      11.8

FORT RANDALL ----------
        ELEV FTMSL          1353.0    1355.2    1355.2    1355.2    1355.2    1355.2    1355.2    1353.5    1346.6    1337.5    1342.7    1349.8    1353.0
       DISCH KCFS              7.8      11.6      20.4      23.1      22.8      24.7      23.2      24.6      26.0      23.8      10.5      11.6       7.4

GAVINS POINT  ---------
        ELEV FTMSL          1206.0    1206.0    1206.0    1206.0    1206.0    1206.0    1206.5    1207.0    1207.0    1207.0    1207.0    1207.0    1206.0
       DISCH KCFS             10.0      13.8      22.8      25.1      24.9      25.8      24.0      25.2      27.5      25.4      12.0      13.0      10.0

SYSTEM ----------------
     STORAGE 1000 AF         42176     43190     43660     43721     44582     44322     43227     42090     40796     39549     39257     39086     39432
      ENERGY GWH              6966       357       556       704       675       753       718       610       554       532       523       590       395
         PEAK POWER MW                  2169      2173      2172      2184      2180      2164      2147      2119      2031      2048      2070      2111
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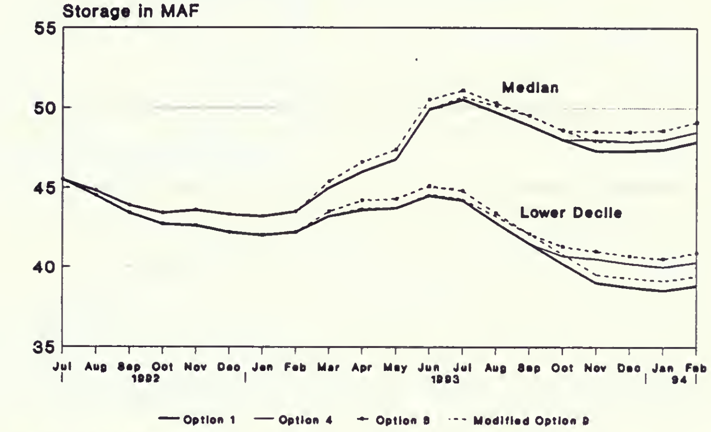
Missouri River Main Stem System Storage

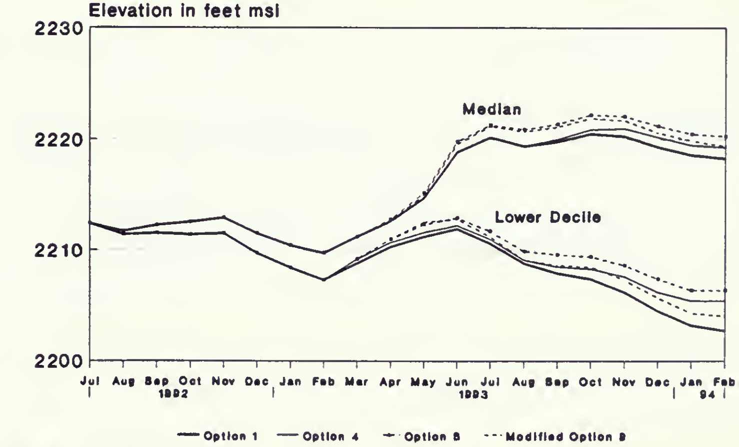
Options 1, 4, 5 & Modified 9



1992-1993 AOP (Preliminary)

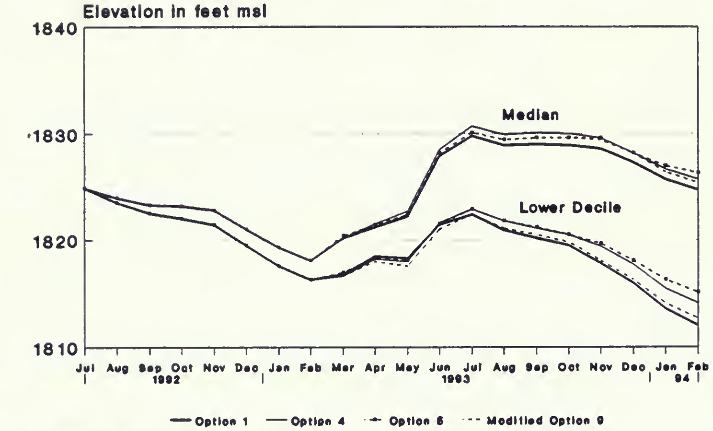
Fort Peck Pool Elevations

Options 1, 4, 5 & Modified 9



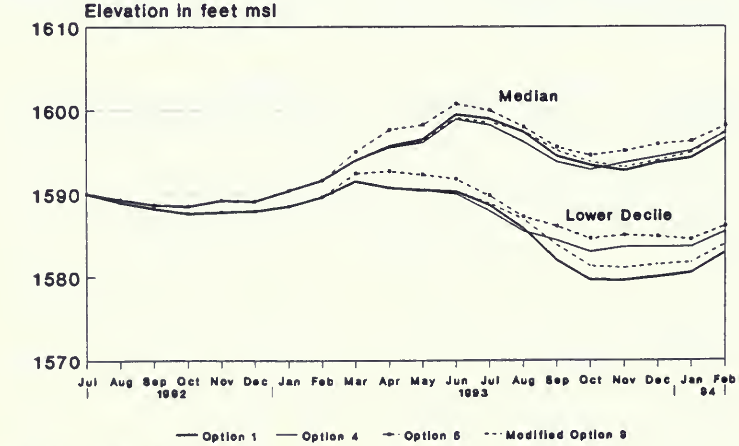
1992-1993 AOP (Preliminary)

Garrison Pool Elevations
Options 1, 4, 5 & Modified 9



1992-1993 AOP (Preliminary)

Oahe Pool Elevations
Options 1, 4, 5 & Modified 9



1992-1993 AOP (Preliminary)

Missouri
River
Natural
Resources
Committee

"CARING FOR THE MISSOURI RIVER'S RESOURCES"

March 16, 1992

John E. Schaufelberger
Colonel, Corps of Engineers
Missouri River Division
PO Box 103, Downtown Station
Omaha, NE 68101-0103

Dear Col. Schaufelberger:

Coordination of fisheries needs with operation of the Missouri River began informally when fisheries biologists and representatives of the Reservoir Control Center (RCC) first met in the early 1960's. A more formal relationship was established in the late 1960's when the upper Missouri River Chapter of the American Fisheries Society formed an Ad/Hoc Committee to coordinate fisheries needs and communicate those to the RCC.

Since that time coordination became more complex as issues such as endangered species, downstream fishery needs, increased fishing use during the 1970's and 1980's and overall awareness of the complexity of the system became known. One idea suggested, by then the Deputy Division Engineer Col. Lee W. Tucker, was to assemble fisheries representatives from each state, affected federal agencies as well as the US Army Corps of Engineers. This meeting was hosted in Omaha by Col. Tucker in November of 1985. The Missouri River Natural Resource Committee (MRNRC) was established at an organizational meeting December 8, 1986.

The MRNRC recently completed its fifth year of existence. Issues, you are well aware of, such as the continued drought, Master Water Control Manual review, mitigation, contaminants and endangered species demand effective coordination more than ever.

The membership of the MRNRC at their recent spring meeting March 9-10 in Minneapolis directed the MRNRC chairman to arrange a meeting with you and a delegation from the MRNRC. We would like to welcome you to the Missouri Basin, share MRNRC objectives and just have an opportunity to meet and visit with you. Would you check your schedule and suggest a couple of dates that would work well for you? I will coordinate with the MRNRC delegation and confirm the meeting dates with you.

Thank you for your consideration of this request.

Sincerely,

Dennis

Dennis Unkenholz
Chairman, Missouri River Natural Resource Committee

cc: Kent Keenlyne, Coordinator
MRNRC delegates

Missouri
River
Natural
Resources
Committee

"CARING FOR THE MISSOURI RIVER'S RESOURCES"

March 17, 1992

Duane Sveum
US Army Corps of Engineers
Missouri River Division
PO Box 103
Omaha, Nebraska 68101-0103

Dear Duane:

Traditionally, the Missouri River Natural Resources Committee (MRNRC) and formerly the Upper Missouri River Chapter of the American Fisheries Society has provided the United States Army Corps of Engineers (USACE) input regarding water level recommendations in an attempt to address natural resource concerns.

Given the current constraints of the Annual Operating Plan and pursuant to recent discussions at the March 9-10 meeting in Minneapolis, the MRNRC requests a minor modification to the immediate operational plans for Lake Sakakawea and Oahe (See attachment A for detailed request and benchmarks). It must be noted this request is based on average precipitation.

The short-term and immediate trade-off in stage between Lake Sakakawea and Oahe will allow for early and sustained inundation of terrestrial vegetation bordering Lake Oahe. As evidenced in both Ft. Peck Lake and Lake Sakakawea in 1991, this flooding of terrestrial vegetation promotes overall fish production. Early inundation of vegetation in Lake Oahe should specifically enhance northern pike reproduction.

Presently, Lake Oahe is within one vertical foot of this vegetation zone, while Lake Sakakawea is more than eight feet from the terrestrial vegetation. Furthermore (based on average precipitation), the high water level projection indicates Lake Sakakawea will remain three feet below the vegetation zone this summer. Given this information, the MRNRC recognizes the opportunity to attempt flooding additional vegetation in Lake Oahe.

With the current status of the three upper Missouri River Mainstem Reservoirs (Lake Sakakawea in particular) as well as the minor magnitude of this proposed storage trade-off (1-1/2 feet), it is felt no additional harm will occur to Lake Sakakawea's fishery. At the same time, it is imperative the benchmarks, provided in Attachment A, be followed and Lake Sakakawea remain above 1825 ft. msl during the summer. If lower quartile inflow is experienced, we recommend the USACE adhere to their original March 1 water level management plan.

Lake Francis Case elevation should be held at 1355 msl. This action may facilitate increasing water levels on Lake Oahe. Stable water levels on that reservoir will be acceptable during 1992.

Spiking has been a means of tern/plover management below Gavins Point and Fort Randall dams. The MRNRC determined that option (2) page 29, of Dave Wooster's information should be followed. This would minimized high and low extremes and hopefully provide more flexibility in managing flows for birds.

The requested minimum release of 20,000 cfs for Ft. Randall Dam should be maintained during spring spawning periods, April through Mid-May. This provides river stages high enough to maximize use of the spawning habitat below Ft. Randall Dam.

Present water/snow conditions do not portray an optimistic picture for this year's run-off. If water conditions should improve, the committee recommends maintaining minimum navigation service through September and then extending the navigation season into November.

Thank you for this immediate consideration.

Sincerely yours,

Dennis Unkenholz
Chairman, MRNRC

Missouri
River
Natural
Resources
Committee

March 17, 1992

Neil Stessman
Acting Regional Director
Bureau of Reclamation
Great Plains Region
PO Box 36900
Billings, Montana 59107-6900

Dear Mr. Stessman:

The Missouri River Natural Resources Committee (MRNRC) approved cooperating agency membership for the Bureau of Reclamation. The MRNRC appreciates interest expressed by the Bureau in Missouri River issues. Dennis Breitzman of the Bismarck office has been added to the mailing list and we will send him correspondence and information generated by the group. I personally enjoyed meeting Dennis and look forward to working with him and your agency.

Thank you for your support in this activity.

Sincerely,

Dennis

Dennis Unkenholz
Chairman, MRNRC

cc: Kent Keenlyne
MRNRC Membership

Missouri
River
Natural
Resources
Committee

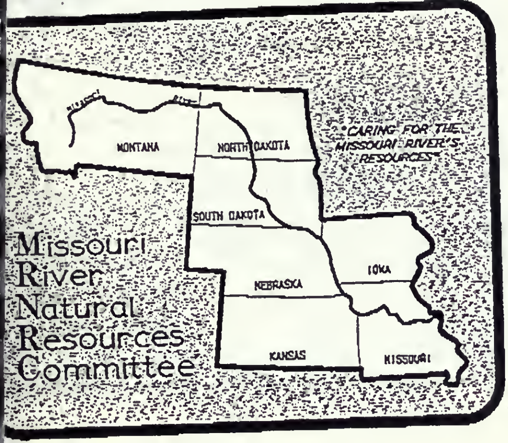
"CARING FOR THE
MISSOURI RIVER'S
RESOURCES"

TO: MRNRC State Representatives
FROM: Dennis Unkenholz
SUBJECT: Tern & Plover Subcommittee
DATE: April 7, 1992

The MRNRC accepted the challenge of facilitating a subcommittee to function as the tern and plover management team. We need to develop subcommittee membership by requesting each state designate a representative who will serve on the team. Please communicate this to your respective administration and send me the name and address of each states designee.

Once the team members have been identified we can pass that information to Doug Latka, who is the COE contact, regarding this issue. I will assist in facilitating their organizational meeting but expect the subcommittee will function on their own and keep the MRNRC informed of their deliberations.

cc: Doug Latka
Other Agency Reps.



Missouri
River
Natural
Resources
Committee

April 29, 1992

Dave Sprynczynatyk
Chairman, Missouri Basin States Association
ND State Water Commission
State Office Bldg.
900 E. Blvd.
Bismarck, ND 58505-0850

Dear Dave:

Even though the 1992 runoff is just beginning, it is time to be thinking about developing recommendations for next year's AOP. I am the current chairman of the MBSA's environmental subcommittee and the Missouri River Natural Resources Committee (MRNRC). As a result, I have thought about how we might better coordinate recommendations between the two organizations. Last year the MBSA and MRNRC presented different recommendations to the Corps which minimized their effectiveness.

The MRNRC's main charge is to coordinate natural resources issues, however, the committee is cognizant of interests of others and considers all needs when coordinating recommendations. Enclosed are several copies of a recently developed brochure which describes the committee functions. The history of our involvement in river operations pre-dates the formal formation of the MRNRC.

Would it be possible for the MBSA and MRNRC to work together to develop recommendations for next year's AOP? Considerable overlap occurs between interests of the MBSA subcommittee and the MRNRC. Could our two groups develop a procedure that would facilitate better coordination of recommendations?

I understand the MBSA will be developing AOP recommendations for next year in August. The MRNRC annual meeting will be held here in Pierre, August 4-6, 1992, at which time, the Committee will develop its recommendation. You, and any of the MBSA members, are invited to participate in the MRNRC meeting and the AOP discussions. You could hear the committee's rationale and discuss how we could develop recommendations to the Corps for next year's annual operations.

Sincerely,

Dennis Unkenholz

Dennis Unkenholz
Chairman, MRNRC

Attatchment

Missouri
River
Natural
Resources
Committee

"CARING FOR THE MISSOURI RIVER'S RESOURCES"

May 4, 1992

Colonel John Schaufelberger
U.S. Army Corp of Engineers
Missouri River Division
PO Box 103
Omaha, Nebraska 68101-0103

Dear Colonel Schaufelberger:

The Missouri River Natural Resources Committee (MRNRC) is an association of natural resource managers representing the states in the Missouri River basin. During the current review of the Master Manual for the operation of the Missouri River, numerous significant actions have occurred, focusing attention on the inter-relationship of the different components of this system.

Primary among this committee's concerns, however, is the effective management of the Missouri River. It must be recognized that activities occurring throughout the basin, whether on the main stem reservoirs, the channelized river, or on a tributary, do have an influence on the system.

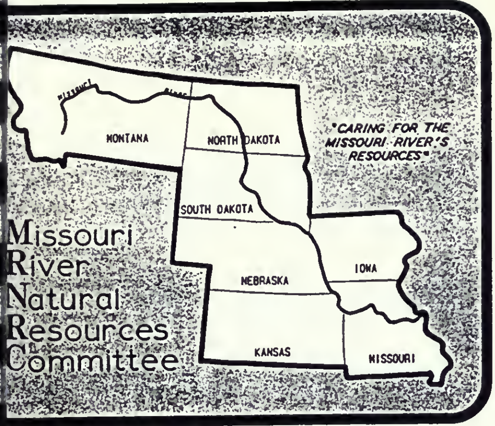
However, to date the master manual review has addressed the main stem Missouri River only, a matter of great concern to the committee. We request that tributaries such as the Kansas River, which is operated as part of the Missouri River system, be included in the review process. We believe this request is warranted because releases from Kansas River impoundments (Milford, Tuttle Creek and Perry) are presently being used to augment navigation flows at Kansas City. An accounting should be made of the benefits and adverse environmental and recreational impacts of these releases. It is our conviction that a true representation of the Corps' Missouri River operations cannot be achieved unless consideration is given to such tributary operations.

Thank you for the attention given this request.

Sincerely,

Dennis

Dennis Unkenholz
Chairman, MRNRC



Missouri
River
Natural
Resources
Committee

"CARING FOR THE
MISSOURI RIVER'S
RESOURCES"

June 17, 1992

Honorable William Clay
U.S. House of Representatives
2470 Rayburn HOB
Washington, DC 20515-2501

Dear Congressman:

The Interjurisdictional Rivers Fisheries Resources Act of 1992 (H.R. 4169) authorizes development of a national strategy for management of large rivers. MRNRC members are very interested in this bill as it is important.

The bill has support from fish and wildlife agencies, the sport fishing industry, sportsman groups as well as professional fisheries groups.

Increased support for large rivers is a national issue and an issue that crosses many state and jurisdictional boundaries. This bill, if passed, would provide the means for interjurisdictional coordination of fisheries management.

Sponsorship of this bill is essential and key to its passage. The MRNRC urges you to consider sponsoring H.R. 4169. Please contact Congressman Steve Gunderson (WI) if you are willing to sponsor the bill.

Sincerely,

Dennis Unkenholz
Chairman, MRNRC

Missouri River Natural Resources Committee

"CARING FOR THE MISSOURI RIVER'S RESOURCES"

August 11, 1992

Colonel John E. Schaufelberger, Division Engineer
Missouri River Division, Corps of Engineers
PO Box 103, Downtown Station
Omaha, Nebraska 68101-0103

Dear Col. Schaufelberger:

Thank you very much for attending the Missouri River Natural Resources Committee (MRNRC) meeting recently held in Pierre. Your willingness to attend the meeting and also participate in the field trip to Whitlocks exemplified your interest in natural resources of the Missouri River. I personally would like to thank your staff for the hard work they do to facilitate requests for information and to explain system operations.

The MRNRC worked hard to develop a recommendation to best meet the needs of natural resources. Several objectives were identified during the discussion that helped direct the MRNRC recommendation. A brief explanation of those objectives seems appropriate for all to review.

The first objective identified is to provide system releases that mimic natural timing of flows while not impacting system storage. These more natural flows would better serve native species and should benefit downstream habitat.

Increased system storage or at a minimum maintaining system storage is an objective that will benefit reservoir fisheries, provide insurance for downstream release if the drought continues and minimize impacts that low reservoir levels have produced.

The final objective is to provide flows more appropriate for tern and plover management. This is a need all are sensitive to and if fledging rates can be met much more operation flexibility will exist.

With these three objectives in mind the MRNRC reviewed the eleven options developed by the MBSA AOP committee. The option that seemed to best meet the above stated objectives is option nine with a modification. The modification would be to provide 24,000 cfs flows during August and September and to title the option natural hydrograph alternative.

Unbalancing storage or favoring one reservoir over another is an idea this group has considered before. Trading storage from one reservoir to another is a way to provide rising water levels during April and May to enhance fish spawning success. The MRNRC requests that the Corps remain open to this concept and further discuss this idea after the final March inflow data is available.

The objectives derived at the MRNRC meeting and stated in this letter should be given major consideration when choosing a final option for the next AOP. Option nine as recommended seems to the MRNRC to be the best option to meet these objectives.

Thank you again for attending our meeting and for the work your staff does.

Sincerely,

Dennis

Dennis Unkenholz, Chairman
Missouri River Natural Resource Committee

cc: Dave Sprynczynatyk, President, MBSA
Brenda Schilf, Chairman, MBSA AOP Committee
Richard Opper, Executive Director, MBSA

Missouri
River
Natural
Resources
Committee

"CARING FOR THE MISSOURI RIVER'S RESOURCES"

August 14, 1992

Mr. P. Patrick Leahy
Deputy Assistant Chief Hydrologist
National Water-Quality Assessment Program
U.S. Geological Survey
Reston, Virginia 22092

Dear Mr. Leahy:

Our organization is a natural resources coordinating committee that works the entire Missouri River, one of the largest rivers in the United States. I am including a brochure to help you become familiar with both the river and our organization.

At our recent Annual Meeting, one of our briefings was on levels of contaminants that have been found in wildlife along the river. In general, alarming levels of metals such as mercury, arsenic, lead, and selenium are being found in the upper basin and agricultural chemicals such as chlordane and atrazine are being found in high levels in the lower basin. Persistent chemicals, like PCB's and DDT (and derivatives), are also being found at levels of concern throughout the system.

Our concern about contaminants is at three levels. Although human health is an aspect we do not deal with directly, it is a concern to us in that several fish consumption advisories already exist in several areas along the river and that sport fishing is a major economic endeavor that could be adversely affected by contaminant accumulation scares. Second, restoration of threatened or endangered species populations and/or depleted fish stocks could be seriously hampered by high levels of contaminants. And, third, understanding the source of contaminants and the processes of bioaccumulation in food chains has serious implications in managing for fish and wildlife resources, especially if toxicants act synergistically.

It is our understanding that your agency is presently reviewing proposals for 1994 NAWQA Program starts. We also understand that these studies usually do not consider large rivers, such as the Missouri, for study and that reservoirs are also not usually included in the assessment process. We do, however, request that you include the Missouri River (or sections of it as appropriate) in your 1994 Program starts.

Besides addressing contaminant concerns, we know of several other programs that NAWQA Program data could be useful for. Efforts are underway to restore several oxbows and chutes along the lower river, studies are being conducted on development and addition of refuge units along the river, mitigation projects are being funded and acquisition and habitat developments are underway, recovery planning is ongoing for the endangered pallid sturgeon, the Master Manual for operation of the river is under review and an EIS being prepared, and several state water plans are being debated and developed. These are just a few ongoing activities that could use water quality data, such as NAWQA, for decision making.

A rising example of how your coordinated water quality studies on the Missouri could be critical in future discussions on the health of the system may help to convince you of the importance of initiating studies on the Missouri River as quickly as possible. Recent federal guidance to states and cities on landfills would have yard wastes (leaves, grass, and trees) eliminated from landfills in the near future. With the impounding, channelization, and decoupling of floodplain connections that have occurred within the last 40 years on the Missouri River, lack of food chain driving nutrients has become a major problem in the whole river ecosystem. The combining of the need to find a safe place to dispose of natural organic material and the need to restore organic material to the nutrient starved river could create a win-win situation. Coordinated assessments such as NAWQA would be critical to deliberations on resolving both of the above problems and whether and where they might be combined to serve the needs of both.

We request that you add the Missouri River to your list of 1994 starts. Looking at the whole system is the preferred approach, but if your criteria restricts your options to flowing river sections, there are still logical units of the river where such studies could be conducted with high return values on data collected. We would also suggest that recovery of riverine species and communities be considered as one of your national synthesis projects.

We appreciate the opportunity to provide comments at this stage and believe that NAWQA studies are essential for resolving a number of concerns on the Missouri River. Numerous activities are approaching critical planning stages, and initiation of NAWQA studies in 1994 would assure that water quality data be incorporated into critical decision making. If you have any questions, or require more information, please feel free to contact our coordinator at the number and address contained on the enclosed brochure.

Sincerely,

Gene Zuerlein

Gene Zuerlein
Chairman, MRNRC

Enclosure

Missouri
River
Natural
Resources
Committee

"CARING FOR THE MISSOURI RIVER'S RESOURCES"

November 20, 1992

Ron Skates, President
Great Plains Region
Native American F & W Society
4052 Bridger Canyon Road
Bozeman, Montana 59715

Dear Ron:

The Missouri River Natural Resources Committee (MRNRC) is an organization made up of fish and wildlife representatives who have a common interest - - The Missouri River. Enclosed please find a brochure which describes our organization. Generally we meet twice a year (March and August) and in reality, we have only been in existence since 1987.

Because Native Americans own land in the basin and have game and fish agencies, we would like to add the names of tribal game and fish personnel along the river to MRNRC's mailing list. Not only would this help us communicate more effectively, but the tribes may want to consider joining our organization once they see what we are all about. Butch Denny and Mike Crosley, Santee Sioux Tribe of Nebraska, were at our August 4-6, 1992 meeting in Pierre.

We would also like to invite a Native American Fish and Wildlife Society representative to talk on issues the tribes are concerned about at our August 1993 meeting which will be hosted somewhere in Nebraska.

Ron, there are many problems with various aspects of fish and wildlife management in and along the Missouri River. But with these problems come many opportunities to do good things for this important ecosystem we call the Missouri.

We appreciate your interest in this area and look forward to hearing from you in the near future regarding the names of tribal game and fish personnel as well as a representative to talk at our August 93 meeting. Please feel free to contact myself (402/471-5555), or our MRNRC Coordinator, Kent Keenlyne (605/224-8693), if you have need of additional information.

Sincerely,

Gene Zuerlein

Gene Zuerlein
Chairman, MRNRC

GZ:dw

cc: State Representatives
Kent Keenlyne

CHAIRMAN'S REPORT 1992

Preparing for completion of this report proved to be a re-education event for me. I was reminded of the many activities the MRNRC now is involved with. Rather than itemize those activities I have chosen to highlight a few that typify the last year. The 1992 annual proceedings will detail each and every activity the MRNRC was involved with.

I feel compelled to express deep regrets and sympathy to those who knew and worked with Richard Schirk, Western Area Power Administration. His unfortunate death, resulting from a plane crash, came as a surprise to all. He was one I greatly appreciated even though I did not know him well. He had a broad understanding of the Missouri River system and understood what it would take to successfully manage all interests in mind. Dick's wisdom and understanding will be missed.

The Master Water Control Manual Study consumed a major amount of our time during 1992. The process used and study results, while not perfect, will serve Missouri River Basin needs long into the future. My hopes are that a meaningful Environmental Impact Statement will be produced. Elevating native fish habitat requirements and generally bringing recreation to the proper perspective has been a success story for all. Hopefully the revised "Master Manual" will not gather dust on some shelf but become a working document that will optimize benefits of the Missouri River System.

Two firsts occurred this year as well. This was the first time, since the MRNRC was organized, that the Division Colonel has met with the group. MRNRC members were able to visit one-on-one with the Colonel and raise issues of concern. The other first was that the MRNRC met with the Missouri River Basin Association (MRBA, formally Missouri Basin State Association) AOP subcommittee as well as several MRBA members. This proved to be an excellent time of sharing concerns from many perspectives as well as an opportunity to meet MRBA representatives personally.

The last activity I wish to raise is the strategic planning effort the MRNRC is currently involved with. This activity, which should be on going, will help us determine direction for our efforts and areas of study in the future. The process used will allow us to focus on identified and prioritized issues.

This year has been gratifying for me personally to see how the MRNRC has grown since the idea for such a group was conceived. I felt my tenure had a running start resulting from the fine effort Norm Stucky provided and my successor Gene Zurlein was already running by the time I returned home from the last meeting. I challenge each of you to be as active and involved in the MRNRC as you can and give your support to the MRNRC leadership and goals.

Respectively submitted,

Dennis Unkenholz

Memorandum

TO : Missouri River Natural Resources Committee Coordinator

FROM : Chairman, Tern and Plover Management Team

SUBJECT: Subcommittee Report

The tern and plover subcommittee met twice this year. The initial meeting was held July 9, 1992 in Pierre, SD followed by a second meeting September 29 and 30 in Pierre. The minutes are attached for inclusion in your annual report. Two meeting are planned this year one in Billings, Montana in June to discuss flow related issues that need to be considered by the MRNRC for their August AOP recommendations to the Corps. The second meeting is proposed for October and will review this years nesting success and develop habitat management recommendations. The following is a list of subcommittee members.

Douglas Latka

Minutes of the
Tern and Plover Management Team Meeting
Pierre, South Dakota

July 9, 1992

The first meeting of the Tern and Plover Management Team (Team) was held in the conference room of the GSA building at 420 South Garfield Avenue in Pierre, South Dakota. Kent Keenlyne, Coordinator for the Missouri River Natural Resources Committee, welcomed the group on behalf of the Chairman, Dennis Unkenholz, who had been called away on other business. The Coordinator provided a brief history about the MRNRC and how the Team became formed as a subcommittee under the MRNRC last March. The Coordinator was to record notes for this meeting. Doug Latka, Chairman for the subcommittee, provided an agenda and had people introduce themselves. A list of attendees is attached to these notes. Mr. Latka indicated the group needed to select a chairman and expressed his hope that the group could identify some goals for the long term. Mr. Latka was elected by the group to continue as chairman.

Nell McPhillips provided a synopsis of actions and events leading up to the formation of this group under the conditions of the Biological Opinion on operation of the main stem dams by the Corps of Engineers (Corps). A brief summary of significant sections of the opinion was provided. The U.S. Fish and Wildlife Service (Service) concluded that operations constituted jeopardy to the two species and identified a set of fledge ratios, flow windows for reaches of the river, and formation of a tern and plover management team to provide management views for the development of Annual Operating Plans (AOP) for the system as prudent actions necessary to remove jeopardy. Joel Medlin added that this team was to provide good sound biology to the development of the AOP and that we needed to be sure that the concerns of the group were provided to the Corps' decision makers.

Dave Wooster provided a handout package for discussion and gave an overview of how the system is operated with target numbers and dates. He indicated that the tern and plover habitat on the Missouri River is somewhat unique in that the river is controlled and that there is some opportunity to attempt to control water to do some good for the birds. The Corps has established recording stations near the most commonly used nesting areas below the dams to help monitor releases. They are trying to meet fledging numbers contained in the Biological Opinion and achieve population numbers as outlined in the bird's recovery plans.

Dave observed that we have been under a drought situation for several years which has created less than normal releases downstream of the dams when the birds are nesting. In the short term, we have attempted to supply as much unvegetated sandbar as possible but, as a result, the vegetation has invaded the areas that are not being flooded during the growing season. In years to come, once the system recovers from the drought, there will be little unvegetated habitat that remains and little opportunity to manage for unvegetated nesting areas. Looking at the records and how the system is operated, it would appear that Oahe may be the best reservoir for stable or falling conditions during the period of nesting for the birds and that this group may wish to address long-range considerations of habitat development opportunities. If substantial refilling started now, we would have about two years to put something into motion to supply new nesting areas for the birds when more normal flows return to downstream areas below the dams.

A report on current activities, studies, status of breeding birds, and breeding success was presented by attendees.

Denny Christopherson - The only habitat work done this year in Montana was on Fort Peck Reservoir near the dam on Charles M. Russell Refuge. Refuge personnel performed a burn of 15 to 20 acres along the shoreline in April. They had a good fire to remove vegetation but did not have birds use the area. Denny felt a fall fire would allow the charred remains to dissipate better which may leave the area more attractive to the birds. No terns were on the reservoir this year, and about 10 pairs of plovers were on the lower end of the reservoir near Big Dry Arm. Bird nesting activity is most likely a function of finding suitable substrate closer to the dam.

Below Fort Peck, they intensively monitor the section between Wolf Point and Poplar. They usually find 4 or 5 plovers nesting in this area, but none were found this year. There were 27 terns with 11 nests in this area, 14 adults and 6 nests near Brockton, and 2 nests near Culberson. Denny mentioned that the downstream area may have been atypical the last few years since penstocks at the dam are undergoing repairs and releases are different than usual.

Kevin Johnson - Kevin said they had cleared by hand three historic sites on two sandbars below Garrison Dam and had burned the debris. They had put out 32 tern decoys on the sites and had scrapes on one area but no nests. Cottonwoods and willows came back on sites very quickly, even denser than before removal, so they need more than just cutting to remove. They also tried snow fence to trap sand on low bar areas which worked well but blew away in winter if not protected. Oyster shell was used to protect drifts from the wind, but higher water in the spring still washed away most of the trapped material. This technique looks promising and can be done in a compatible way with goose nesting concerns.

Kevin said they are intensively subsampling about a third of the area for data on hatching and fledging success. From Garrison to Oahe there were 36 tern and 21 plover nests. A total of 17 sites had birds as of the previous week.

Nell McPhillips - Oahe use is down this year from last due to revegetation of many of last year's sites. They are taking nesting success data on seven sites near Mobridge and at the state line. No clearing or development was done this year in Oahe.

Casey Kruse - Habitat in Gavins Point reach is in serious decline. There were about 30 nests below Fort Randall and about 220 below Gavins Point this year. Predation is a major problem, especially on late nesting birds, for young predators are now starting to hunt and forage themselves. Half of 88 plover nests below Gavins Point Dam were protected with cages. Of 44 not protected, only one hatched. Strobe lights worked well for deterring owls, but one light failed one night and the owls got nearly all of the young birds. Mink, coon, and skunk are primary predators in shoreward areas.

Sites that were developed by dredging worked extremely well this year with one only about 20 feet across having 17 nests. Bigger escape areas are needed, however, for owls cleaned off all the chicks when they hatched. They also tried pulling cottonwoods by hand in the fall on one island which worked well. The vegetation did not come back when pulled out by the roots, but the area was not as desirable to birds as the dredged sites.

Becky Latka - Becky provided a handout on some of the habitat modifications that were tried. Work was done in February and April with heavy equipment to raise some islands below Fort Randall Dam at Lewis and Clarke Lake headwaters. Although a promising technique, better methods are needed to be able to work in the area with big equipment, and more information is needed on whether birds will use modified areas. The best use was on the small islands created at Lewis and Clark Lake headwaters with a dredge. Because of limitations of equipment, the developed areas were small. They noticed problems with the small areas washing away, but birds really zeroed in on these newly created sites.

Greg Wingfield - Greg reported that both terns and plovers were up on the Niobrara River last year. They are both down in numbers on the lower Platte River this year. Nebraska Power is trying island building on Lake McConaughy for terns and plovers as part of their FERC relicensing. The group may be able to compare notes with their efforts.

Rochelle Renken - With water conditions as they were, this year would have been a likely year for birds to pioneer on the Missouri River. However, no one is monitoring the Missouri River, since water releases normally prevent birds from using the area. In mid-June, they had 550 tern nests on the Mississippi River adjacent to the state of Missouri with an average fledge ratio of 0.5. The main problem the birds experience on the Mississippi River is flooding of nests and especially from the Ohio River. There are also predation and human disturbance problems at some of the 14 sites they have.

After considerable discussion, the team members decided that they need to better define short- and long-term objectives for the group. Mr. Latka explained that besides general goals and objectives, the group needed to provide recommendations for development of the AOP and some recommendations for a tern and plover management plan to help agencies prioritize work and set priorities in data gathering. The group decided to meet again in Pierre on September 29 and 30, 1992, to scope out long- and short-term goals for the group and develop recommendations for the MRNRC Executive Board before the March meeting. The Service needed to submit their subcommittee members names to the Chairman yet, and all were asked to think about habitat improvement opportunities for their reaches of the river. Members were asked to contact their MRNRC representative with their recommendations before the August 4-6 meeting in Pierre.

Respectfully submitted,

Kent Keenlyne

Kent Keenlyne
MRNRC Coordinator

Attachments

- USFWS Chronology of Biological Opinion Development (included)
- COE Habitat Creation Activities Below Fort Randall Dam (included)
- D. Wooster's package (available upon request)

Attendees of the July 9, 1992, Tern and Plover Management Team Meeting

NAME	AGENCY
Greg Wingfield	Nebraska Game and Parks; Lincoln, NE (402) 471-5420
Casey Kruse	U.S. Fish and Wildlife Service; Yankton, SD (605) 222-1185
Kent Keenlyne	MRNRC Coordinator; Pierre, SD (605) 224-8693
Kevin M. Johnson	U.S. Fish and Wildlife Service; Bismarck, ND (701) 250-4414
Nell McPhillips	U.S. Fish and Wildlife Service; Pierre, SD (605) 224-8693
Joel Medlin	U.S. Fish and Wildlife Service; Bismarck, ND (701) 250-4402
Rochelle Renken	Missouri Dept. of Conservation; Columbia, MO (314) 882-9880
Dennis Christopherson	U.S. Fish and Wildlife Service; Billings, MT (406) 657-6750
Randy Kreil	ND Game and Fish Department; Bismarck, ND (701) 221-6321
Eileen Dowd Stukel	SD Dept. of Game, Fish and Parks; Pierre, SD (605) 773-4229
Sharon Whitmore	U.S. Fish and Wildlife Service; Pierre, SD (605) 224-8693
Bruce Johnson	SD Dept. of Agriculture; Pierre, SD (605) 773-3724
Rick Moore	Corps of Engineers; Omaha, NE (402) 221-4204
Stan Zschomler	U.S. Fish and Wildlife Service; Pierre, SD (605) 224-8693
David Wooster	Corps of Engineers; Omaha, NE (402) 221-7350
Becky Latka	Corps of Engineers; Omaha, NE (402) 221-4602
Doug Latka	Corps of Engineers; Omaha, NE (402) 221-7281

SUMMARY OF FISH AND WILDLIFE SERVICE
BIOLOGICAL OPINION ON OPERATIONS OF
MISSOURI RIVER MAIN STEM SYSTEM

CHRONOLOGY OF BIOLOGICAL OPINION DEVELOPMENT

March 4, 1986
Fish and Wildlife Service (FWS) provided comments on the Corps of Engineers' (Corps) Environmental Assessment on operations of Missouri River Main Stem System. FWS requested Corps enter into formal Section 7 consultation.

April 8, 1986
Corps requested formal Section 7 consultation.

October 19, 1987
Corps completed Environmental Assessment on operations of Missouri River Main Stem System.

November 20, 1987
FWS requested additional information from Corps to prepare Biological Opinion (Opinion).

May 26, 1989
Corps provided additional information and considered this transmittal as initiating formal consultation.

February 13, 1990
FWS provided Corps with draft Opinion for comments.

February 22, 1990
FWS and Corps met in Pierre, SD to discuss Opinion.

March 15, 1990
Corps provided FWS with comments on draft Opinion.

April 30, 1990
FWS incorporated Corps' comments into Opinion and another draft was sent to corps.

July 13, 1990
Corps provided FWS with comments on draft Opinion.

September 4, 1990
FWS incorporated some of Corps' requested revisions and issued another draft Opinion.

November 2, 1990
Conference call between FWS and Corps. Draft Opinion was finalized.

November 14, 1990
FWS Regional Director signed final Biological Opinion and issued it to Corps.

BIOLOGICAL OPINION SUMMARIZED

Endangered Bald Eagle - Not likely to jeopardize

Conservation recommendations:

1. Corps' project offices evaluate and map potential wintering and breeding habitat on the Missouri River.
2. Corps census breeding and wintering bald eagles on Corps property.
3. Corps' project offices draw up and implement plans for protection, conservation, and restoration of bald eagles on Corps land.
4. Evaluate a potential hacking program on Missouri River. If found feasible, a hacking program should be implemented.
5. Closer working relations between Corps and the FWS Karl Mundt National Wildlife Refuge.

Endangered Interior Least Terns/Threatened Piping Plovers - Likely to jeopardize

Reasonable and Prudent Alternatives:

1. Manage flows and discharges such that:
    a. Operational-caused flooding should be avoided during breeding season. Flows will be set by nest initiation.
    b. Provide conditions that will meet or exceed fledge ration goals of 0.70 for least terns and 1.44 for piping plovers.
        1. Proximity to forage habitat - Least tern nesting areas no >400 meters from forage areas. Piping plover nesting areas must include sandbar flats.
        2. Substrate - Nesting substrate should = fine sand.
        3. Vegetation (at nest initiation) - Percent cover on sandbars <25 percent, optimum <10 percent.
        4. Elevation of nests above river level - Nesting areas should be 8 inches or greater above river levels.

        5. Disturbance-free area - Nesting areas should be free of predation and human disturbance.

    c. Create additional nesting habitat when release flows are as follows:

    Fort Peck - >8,500 cfs & <13,200 cfs
    Garrison - >18,000 cfs & <31,000 cfs
    Fort Randall - >28,000 cfs & <38,500 cfs
    Gavings Point - >30,000 cfs & <39,500 cfs

2. Provide information to, and/or meet with, FWS during development of the Corps' draft Annual Operating Plan to ensure Opinion objectives are met.

3. Compile an annual report by December 31 or include in the Annual Operating plan an outline for least tern and piping plover management actions. This will allow the FWS and the Missouri River Tern and Plover Management Team to evaluate effectiveness of Corps' actions. Report should include:

    a. Least tern and piping plover fledge ratios.
    b. Least tern and piping plover population survey results.
    c. Nest elevations.
    d. Map of nesting habitat, including changes in sandbar morphology during the nesting season.
    e. Sandbar acreages.
    f. Historic hourly release data from all dams, including water levels for all reaches for the May 12 to August 30 season.

4. Form a Missouri River Tern and Plover Management Team (Team). Corps will schedule and arrange Team meetings.

5. Map, every 3 years, all essential least tern and piping plover nesting habitat used on the Missouri River. Maps will be provided in annual report.

6. Continue "Investigations of Channel Degradation" studies.

Conservation Recommendations:

1. Monitor least tern/piping plover populations each year on reservoirs.
2. Maintenance dredging operations or permits (Section 10/404 of Clean Water Act) should be evaluated, in consultation with FWS, for creating habitat.
3. Strive to meet Missouri River recovery goals of 800 least tern adults for 10 years; 975 piping plover adults for 15 years.

Incidental Take

A minimal amount of incidental take of least terns and piping plovers will occur as a result of system operations, even if reasonable and prudent alternatives are successfully implemented. The extent of take that is not likely to jeopardize the species is that which will not cause the fledge ratios to drop below 0.70 (terns) and 1.44 (plovers) during a given nesting season.

Reasonable and Prudent Measures Necessary to Minimize Take:

1. Monitor nesting habitat on riverine reaches below dams, including headwaters of Lewis and Clark Lake, as well as reservoir areas during long-term droughts. to determine fledge success and total number of adult birds.
2. Monitor daily/hourly fluctuations of dam releases to avoid unnecessary take and document unavoidable taking.
3. Continue to evaluate operational changes used to avoid take.
4. Implement public info and education to increase public awareness.

Terms and Conditions That Implement the Reasonable and Prudent Measures:

Measure No. 1 - Productivity and population surveys on riverine reaches will be conducted each year (reservoirs surveyed during drought years).

a. Population surveys shall include:

    1. Total number of colonies.
    2. Total number of birds.

        3. Map of areas used for nesting (includes sandbar acreages).

    b. Productivity estimates will include:

        1. Total number of nests.
        2. Fledge ratios.
        3. Causes of nest and chick loss.
        4. Elevation of nests above water levels and distance to water's edge.

Measure No. 2 - Document and report to FWS all incidence of take.

Measure No. 3 - If new operational scenarios, that were not considered during this consultation, are developed, then consultation will be reinitiated.

Measure No. 4 - Implement the following actions:

a. Production of a Public Service Announcement.
b. Corps' project offices will engage in intensive public relations efforts.
c. Post and rope all nesting areas on the Missouri River.

Procedures for Handling or Disposing of Least Terns and Piping Plovers:

All eggs, chicks, or adults found dead on the Missouri River will be reported to FWS immediately (within 24 hours).

Annual Report

In regard to Reasonable and Prudent Measures 1 through 3, in addition to those items identified in Reasonable and Prudent Alternative 3, the Corps will include the following in the annual report:

a. Any taking, including reasons for take and actions to avoid take.
b. Evaluation of operational efforts to avoid take.

Summary - Consultation Reinitiated

1. If new info becomes available.
2. If new species are listed.
3. System design/operation is modified
4. Reasonable and prudent measures/alternatives not carried out.
5. Fledge ratio goals not met.
6. Revision of Master Manual.

HABITAT CREATION BELOW FT. RANDALL DAM

- RM 869, levelled dunes and scraped vegetation on the downstream end. Total area worked was approximately one acre. One plover nest, 6 tern nests.

- RM 866.7, pushed sand up to higher elevations on the main island and a banana-shaped island; connected the main island to a smaller island. All areas were two to three feet higher in elevation after completion of work. Large driftwood was placed at the upstream ends of the banana island and the main island. Total area elevated was under two acres. Sighted plovers on the island in May.

- RM 853.8, knocked down brushy vegetation, levelled high dunes on upstream end of island, left willows standing on extreme upstream end to collect wind-borne sand. Total area worked was approximately one acre.

- The 200th Bridge Unit of the South Dakota National Guard assisted in transporting equipment to the islands.

- The operation occurred during April, and took about three days.

HABITAT CREATION ABOVE LEWIS AND CLARK LAKE

- Five small islands were created at approximate RMs 833.8, 833.1, 833.0, 832.8, and 832.0.

- Islands were created using a crane-on-barge dredge operation, piling dredged sand onto existing low-elevation islands.

- The operation required special flows to float the barge.

- The operation took place in April and took approximately two weeks.

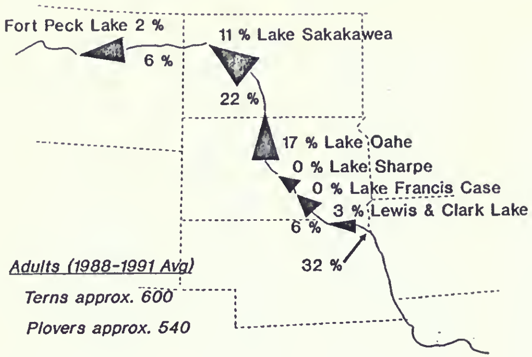
HABITAT CREATION BELOW GAVINS POINT DAM

- A one-day volunteer project involving hand-pulling small saplings from 10 locations on five islands located at RMs 803.7, 790.5, 790.3, 766.2, and 757.3.

- Despite nasty weather, over 30 volunteers turned out to participate.

- The Corps funded a second year of a patterned vegetative removal study along islands in this reach.

POPULATION DISTRIBUTION FOR TERNS AND PLOVERS

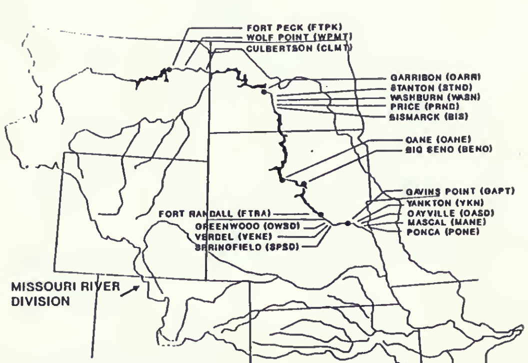


Adults (1988-1991 Avg)

Terns approx. 600

Plovers approx. 540

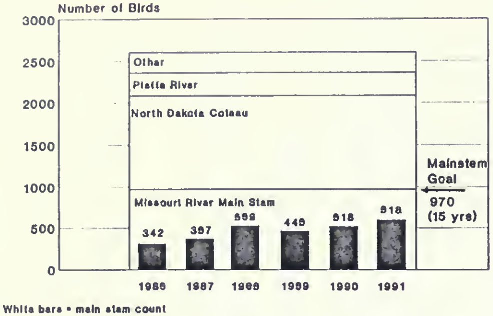
11



MISSOURI RIVER
TERN AND PLOVER DATA
COLLECTION PLATFORMS

12

Adult Plover Population Goal
Missouri River & Tributaries



13

Adult Tern Population Goal
Missouri River & Tributaries

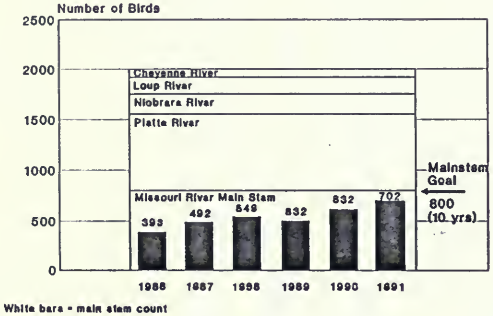


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TABLE XVIII
Missouri River Main Stem
Least Tern and Piping Plover Survey Data

	Interior Least Terns						Piping Plovers					
	1986	1987	1988	1989	1990	1991	1986	1987	1988	1989	1990	1991
Ft. Peck Lake												
Adults	-	6	3	6	8	10	16	10	10	12	22	25
Fledglings/Pair	-	-	-	-	-	.50	-	-	-	1.5	-	1.0
Peck Lake to Lake Sakakawea												
Adults	-	-	10	51	92	46	-	-	5	11	17	15
Fledglings/Pair	-	-	1.66	1.43	.20	.70	-	-	-	-	0	0
Lake Sakakawea												
Adults	-	-	7	15	6 *	8	-	-	143	57	132	156
Fledglings/Pair	-	-	-	-	-	0	-	-	-	-	-	-
rison to Lake Oahe												
Adults	171	175	143	122	171	195	139	160	115	86	71	121
Fledglings/Pair	-	-	.95	.42	.44	.65	-	-	1.0	.24	1.05	1.06
Lake Oahe												
Adults	16	21	88	97	100	143	6	4	55	160	86	87
Fledglings/Pair	.75	1.62	-	-	-	-	-	2.5	.9	-	-	-
Randall to Lewis & Clark												
Adults	25	86	45	6	67	63	11	16	51	0	31	45
Fledglings/Pair	.40	.43	.16	0	.34 **	.23	.10	.15	.07	0	.60	**.21
Lewis and Clark Lake												
Adults	-	-	-	29	21	25	-	-	-	16	11	13
Fledglings/Pair	-	-	-	.64	.34 **	0	-	-	-	.56	.69 **	0
vins Point to Ponca												
Adults	161	232	252	210	186	193	172	177	212	122	144	165
Fledglings/Pair	.16	.67	.49	.55	.46	.26	.05	1.13	.62	.21	.61	.33
Adult Totals	553*	492*	549	532	632	702	342*	367*	549	446	516	618

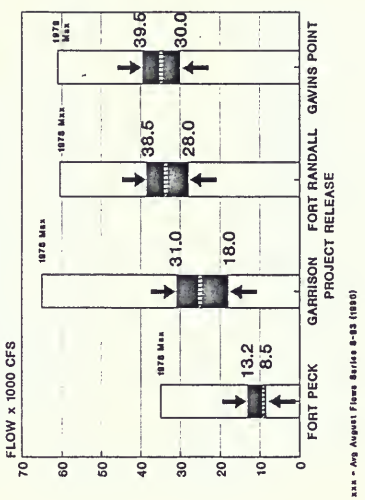
- Data not collected
* Partial survey results
** 0.34 and 0.69 Fledglings/Pair includes Ft. Randall to Lewis & Clark and Lewis & Clark Lake.

1991 data preliminary

15

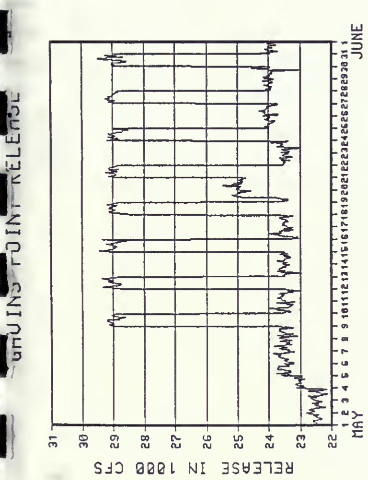
16

DAILY RELEASE RATE FOR CREATED HABITAT



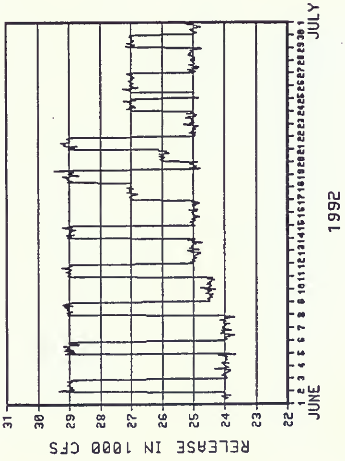
xxx - Avg August Flows Series 8-83 (1990)

17

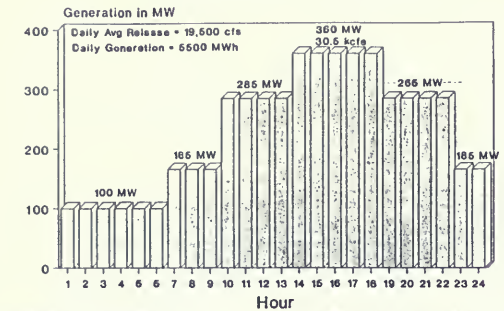


18

GAVINS POINT RELEASE



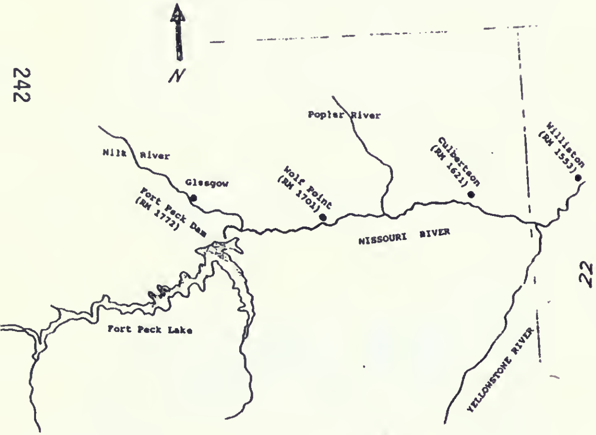
Garrison Daily Generation Pattern 1992
Endangered Species Nesting Season



During 8-hr peak, 1 hr of 390 permitted if followed by equal sag next hr.

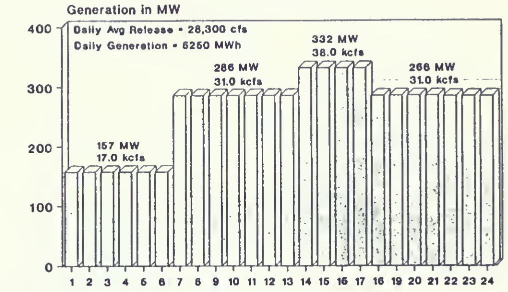
During off-peak, 2-hrs of 300 permitted if followed by an equal sag next 2 hrs.

21



22

Fort Randall High Day Peak Pattern 1992
Endangered Species Nesting Season

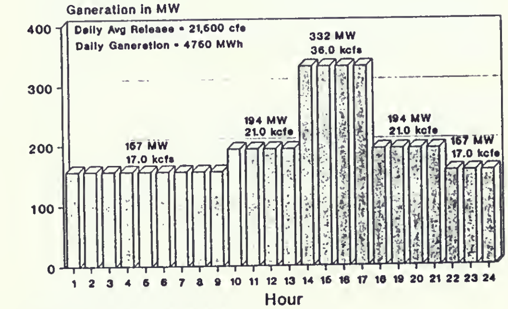


High release made every third day

Do not exceed 288 MW for periods shown

19

Fort Randall Low Day Peak Pattern 1992
Endangered Species Nesting Season



Low release two consecutive days during three day period

Non-peak periods will vary as needed, but not below 185 MW

20

29 May 1992

ESTIMATED ELEVATION CHANGES FOR BIRDS BELOW FORT PECK

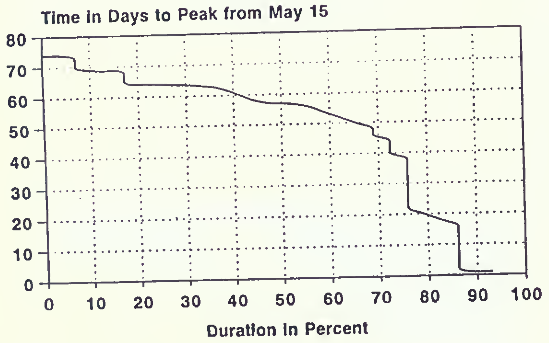
	Daily Avg Q (cfs)	Max Hrly Peaking	River Mile	Peak Stage	Elevation Increase (ft)
TERN 1	8,000 cfs*	8,000 cfs	1,682.3 1,687.7	1943.07 1948.55	
PATTERN 2	8,000 cfs*	12,000 cfs for 8 hr	1,682.3 1,687.7	1943.40 1948.77	0.3 0.2
PATTERN 4	8,000 cfs*	16,000 cfs for 4 hr	1,682.3 1,687.7	1943.35 1948.73	0.3 0.2
TTERN 3	10,000 cfs**	13,000 cfs for 8 hr	1,682.3 1,687.7	1946.49 1949.68	1.4 1.1
PATTERN 5	10,000 cfs**	16,000 cfs for 8 hr	1,682.3 1,687.7	1944.60 1949.77	1.5 1.2

et. 50% to 80% chance of 8,000 cfs or less daily avg. summer 1993.
est. only 25% chance of release this high or greater summer 1993.

Note: RCC will be making preliminary AOP runs 2nd week of July 92 which will give a better estimate of 1993 Fort Peck summer releases.

Fort Peck Lake

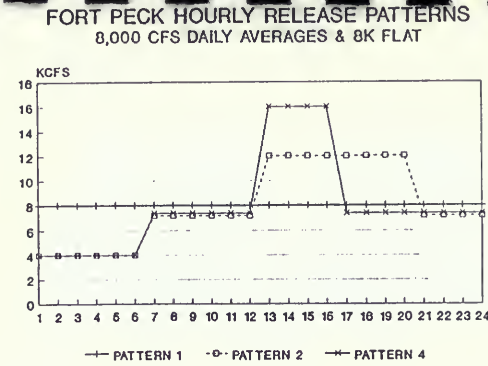
May 15-Aug 15, 1967-1991



26

FORT PECK HOURLY RELEASE PATTERNS

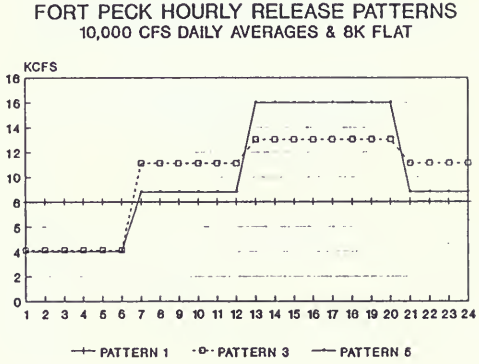
8,000 CFS DAILY AVERAGES & 8K FLAT



23

FORT PECK HOURLY RELEASE PATTERNS

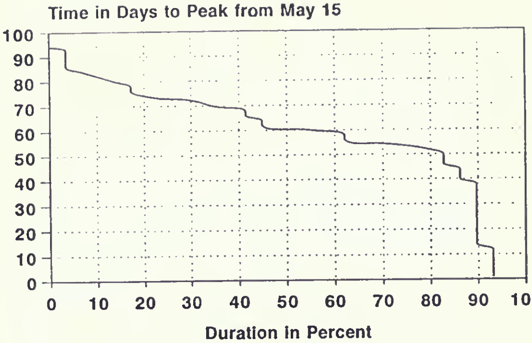
10,000 CFS DAILY AVERAGES & 8K FLAT



24

Lake Sakakawea

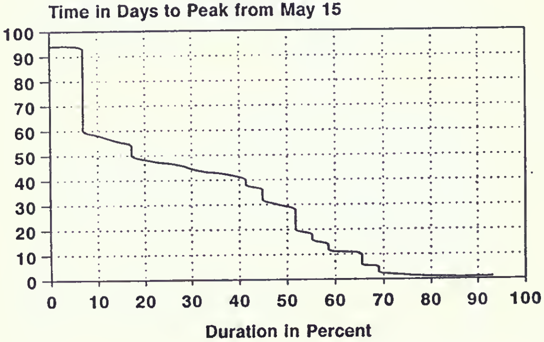
May 15-Aug 15, 1967-1991



27

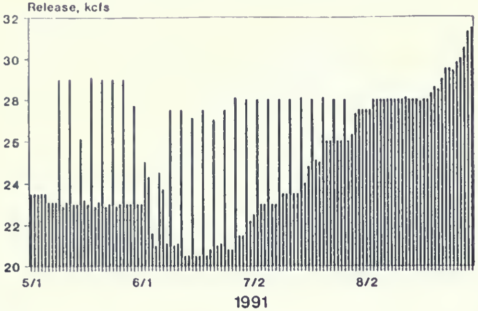
Lake Oahe

May 15-Aug 15, 1967-1991



28

Gavins Point Dam
Average Daily Release



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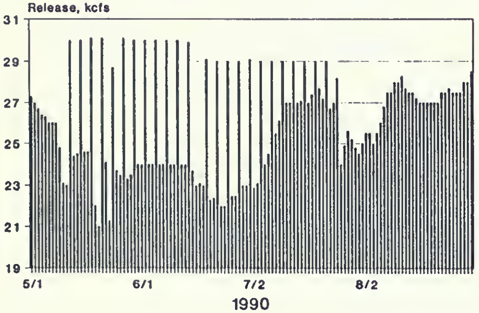
Gavins Point Dam
Average Daily Release



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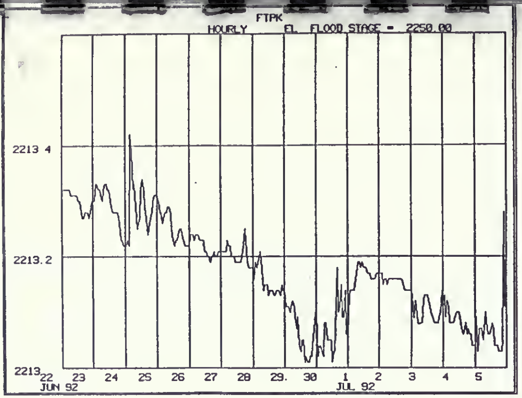

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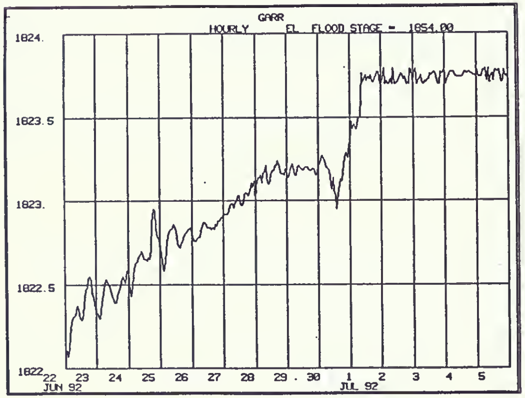

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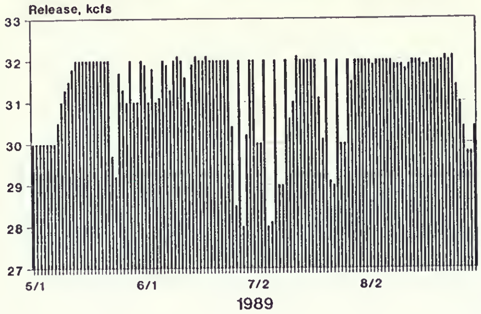
Gavins Point Dam
Average Daily Release



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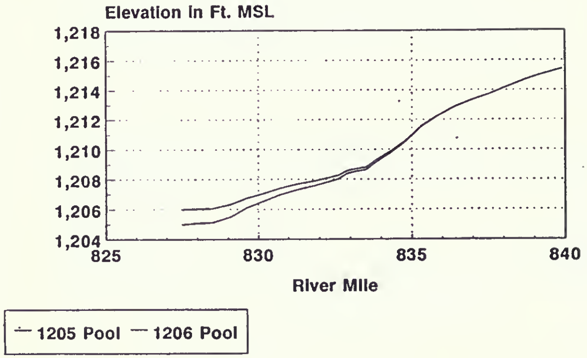
MISSOURI RIVER
Ft. Randall to Gavins Point



32

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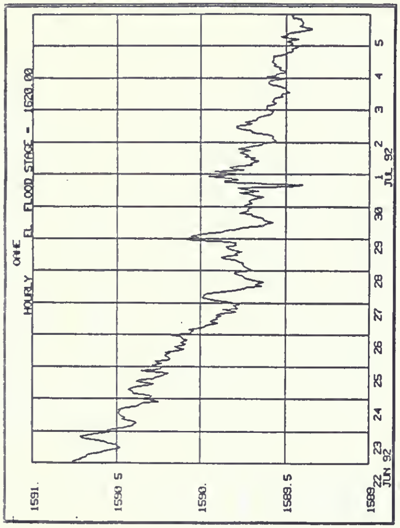
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OAHE
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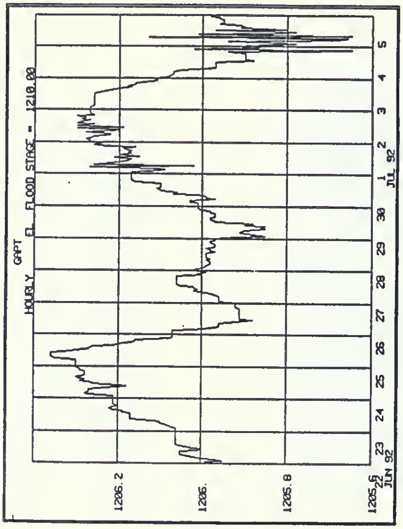
1590.5
1590.
1589.5
1589
22 23 24 25 26 27 28 29 30
JUN 92
1 2 3 4 5
JUL 92

36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GAPT
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1206.
1205.8
1205.6
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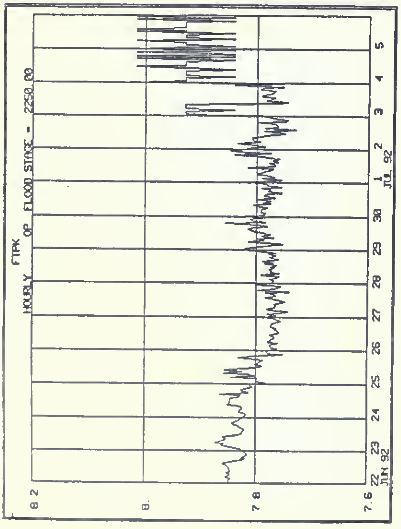
JUN 92
1 2 3 4 5
JUL 92

37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FTPK
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8.
7.8
7.6
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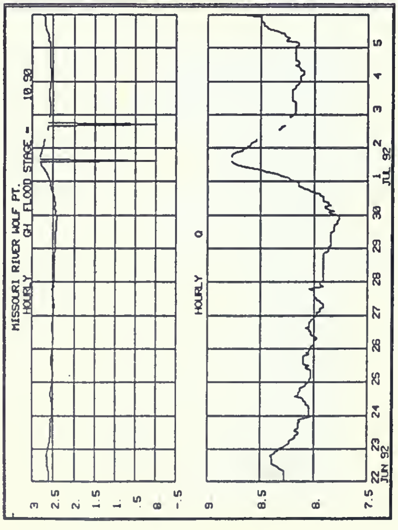
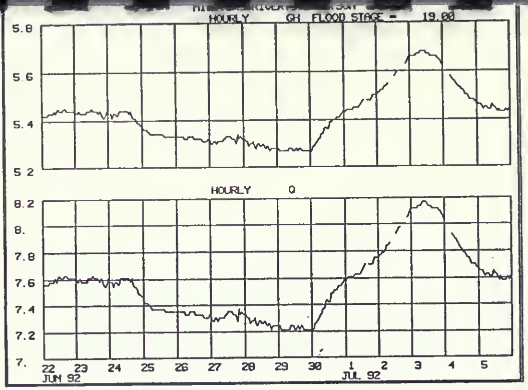
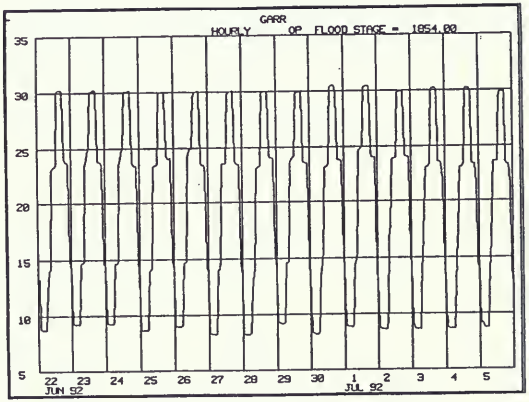
JUN 92
1 2 3 4 5
JUL 92

38


MISSOURI RIVER WOLF PT.
HOURLY
GH FLOOD STAGE = 10.90
3
2.5
2.
1.5
1.
.5
0
-.5
HOURLY
Q
9
8.5
8.
7.5
22 23 24 25 26 27 28 29 30
JUN 92
1 2 3 4 5
JUL 92


RIVER
HOURLY GH FLOOD STAGE = 19.00
HOURLY Q
5.8
5.6
5.4
5.2
8.2
8.
7.8
7.6
7.4
7.2
7.
22 JUN 92
23
24
25
26
27
28
29
30
1 JUL 92
2
3
4
5

39


GARR
HOURLY OP FLOOD STAGE = 1854.00
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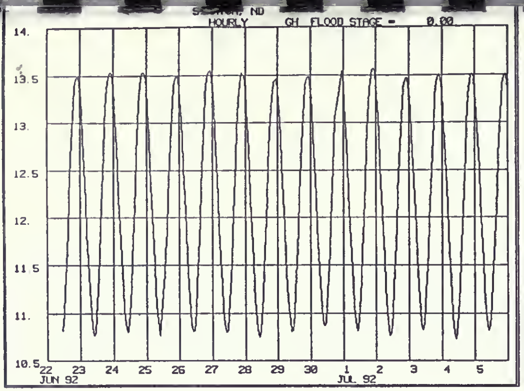
30
25
20
15
10
5
22 JUN 92
23
24
25
26
27
28
29
30
1 JUL 92
2
3
4
5

40


ND
HOURLY GH FLOOD STAGE = 0.00
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13.
12.5
12.
11.5
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23
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27
28
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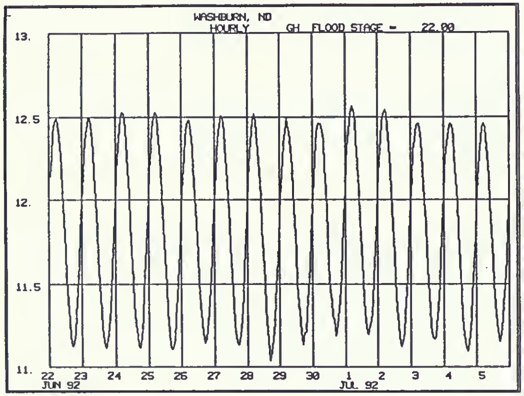
30
1 JUL 92
2
3
4
5

41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HOURLY GH FLOOD STAGE = 22.00
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11.
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28
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1 JUL 92
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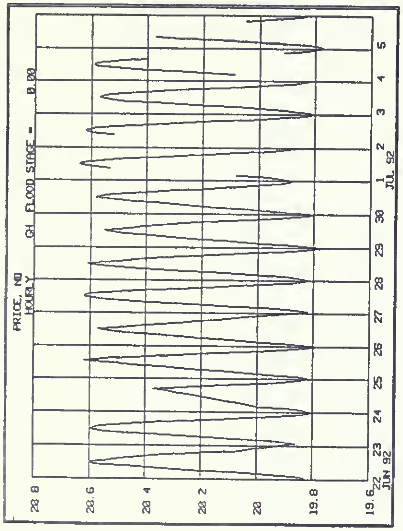
3
4
5

42

43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HOURLY
GH FLOOD STAGE = 0.00
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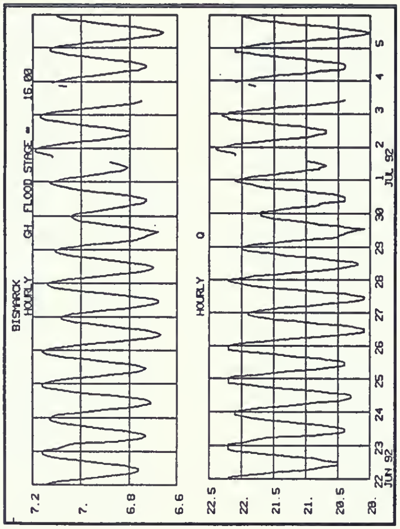
20.6
20.4
20.2
20
19.8
19.6
22 JUN 92
23
24
25
26
27
28
29
30
1 JUL 92
2
3
4
5

44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HOURLY
GH FLOOD STAGE = 16.00
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6.8
6.6
HOURLY
Q
22.5
22.
21.5
21.
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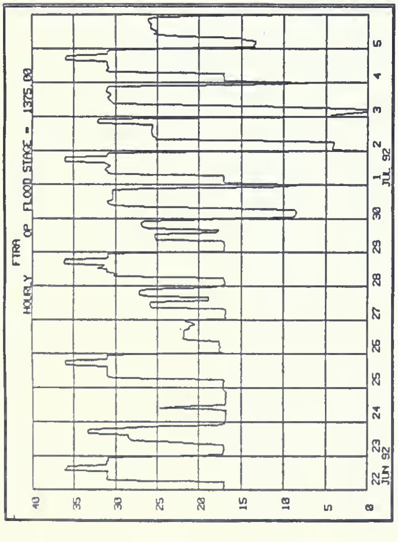
2
3
4
5

45


FTRA
HOURLY
OP FLOOD STAGE = 1375.00
40
35
30
25
20
15
10
5
0
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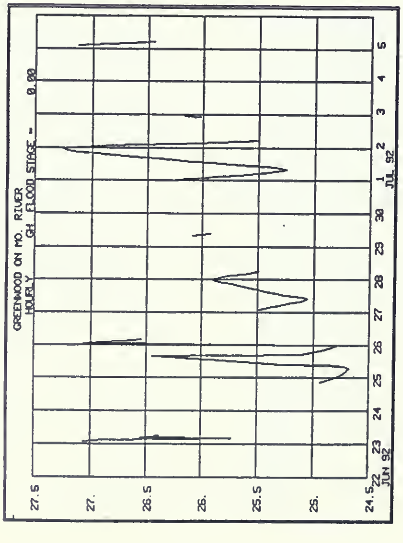
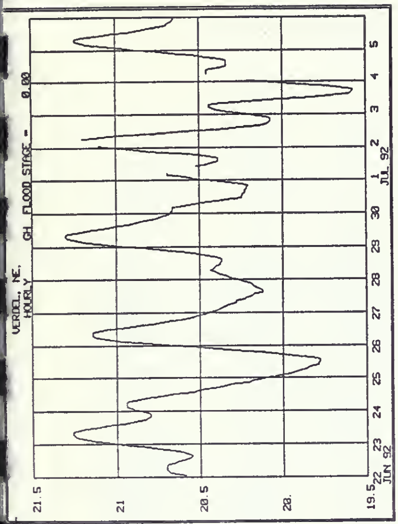
23
24
25
26
27
28
29
30
1 JUL 92
2
3
4
5

46


GREENWOOD ON MO. RIVER
HOURLY
GH FLOOD STAGE = 0.00
27.5
27.
26.5
26.
25.5
25.
24.5
22 JUN 92
23
24
25
26
27
28
29
30
1 JUL 92
2
3
4
5

47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21.5
21
20.5
20.
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22
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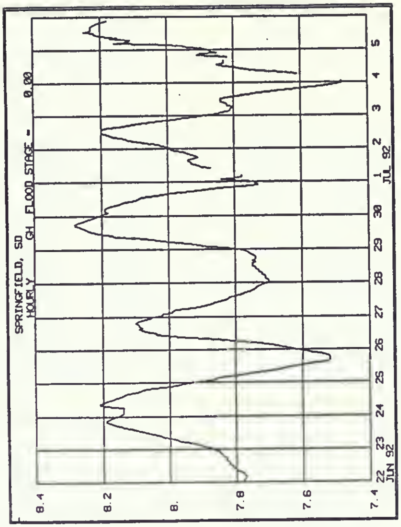
24
25
26
27
28
29
30
1
2
3
4
5
JUN 92
JUL 92

48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HOURLY
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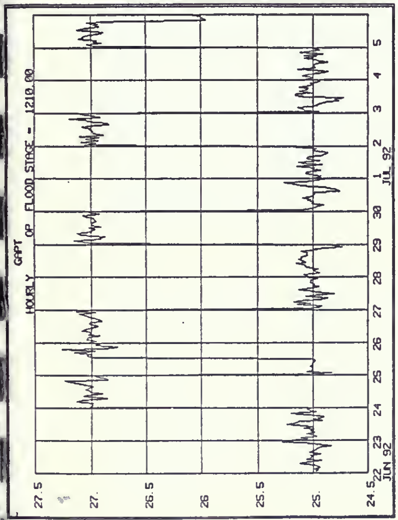
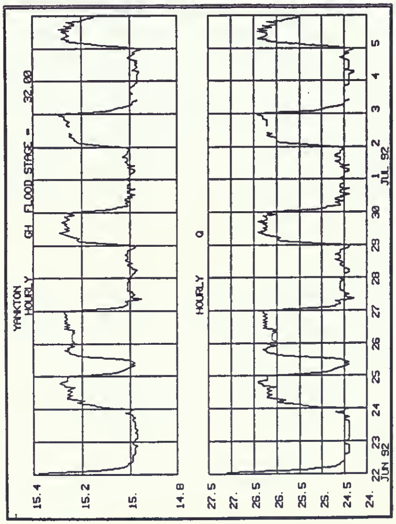
8.2
8.
7.8
7.6
7.4
22
23
24
25
26
27
28
29
30
1
2
3
4
5
JUN 92
JUL 92

49


HOURLY
GAPT
OP FLOOD STAGE = 1210.00
27.5
27.
26.5
26
25.5
25.
24.5
22
23
24
25
26
27
28
29
30
1
2
3
4
5
JUN 92
JUL 92

50


YANKTON
HOURLY
GH FLOOD STAGE = 32.00
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15.2
15.
14.8
HOURLY
Q
27.5
27.
26.5
26.
25.5
25.
24.5
24.
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25
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28
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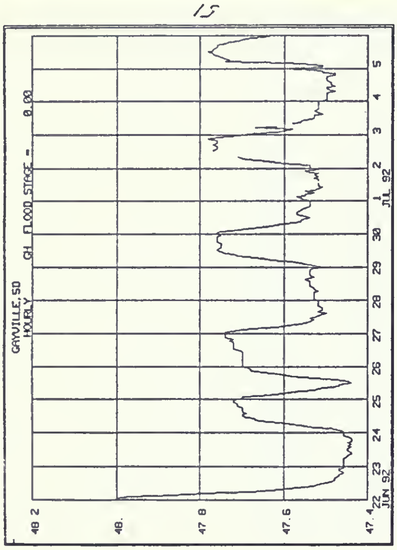
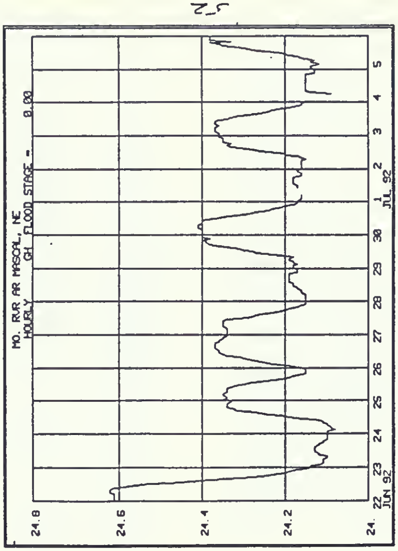
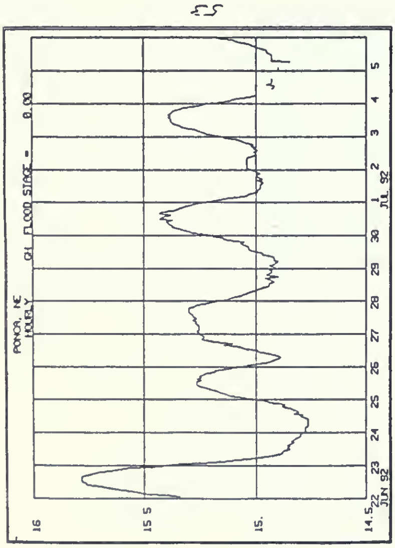
JUN 92
JUL 92







EARLY JULY NEST COUNT 1991 vs 1992 - MISSOURI RIVER

Location	7/3/91		7/8/92	
	Terns	Plovers	Terns	Plovers
Ft Peck Lake	3	2	0	26
Ft Peck to Lake Sakakawea	14	2	11	0
Lake Sakakawea	-	-	-	-
Garrison to Lake Oahe	46	19	36	21
Lake Oahe	41	32	29	8
Ft Randall to Lewis & Clark L	33	25	9	3
Lewis & Clark Lake	8	4	12	1
Gavins Pt to Ponca	80	54	52	21
Totals	225	138	149	80

Note: - = not surveyed yet

Minutes of the
Tern and Plover Management Team Meeting
Pierre, South Dakota

The second meeting of the Tern and Plover Management Team (Team) subcommittee was held in Pierre, South Dakota, on September 29 and 30, 1992. A list of attendees is attached. Doug Latka served as chairman for the group.

The first question raised was whether the names of representatives from each organization had been received. Each state had submitted a single name; however, the U.S. Fish and Wildlife Service (Service) had submitted five names. After considerable discussion, it was agreed to attempt functioning this way by taking advantage of all available expertise on terns and plovers and not worrying about agency representation unless it became a problem.

Stan Zschomler indicated that he had problems in placing the Team under the auspices of the MRNRC. The Biological Opinion on operations was the authority for formation of this Team, and the MRNRC had no authority for threatened or endangered species. He was concerned that the MRNRC parent committee would filter comments to the Corps of Engineers (Corps) and not meet the intent of forming the Tern and Plover Management Team. Doug Latka indicated that the responsibility for establishing the Team was given to the Corps under the Biological Opinion and that they had decided that it is important to coordinate activities with other resource concerns. The Corps recognizes the Service's concerns but has decided that a coordinated effort through the MRNRC will provide for better long-term solutions to protection and recovery of terns and plovers. Latka indicated that he would talk to the parent committee about letter writing procedures on behalf of the subcommittee. It was decided that recommendations from the group would be submitted to the parent MRNRC.

Discussions were initiated on what the goal of the group should be. Randy Kreil noted that, at the last meeting, members were charged with the task of looking at short- and long-term goals. Casey Kruse wondered if our focus should be on meeting fledge ratios or in reaching total numbers as identified in the recovery plans for the species. Latka indicated that both aspects needed to be addressed: Fledge ratios were not being met the last couple years but they also needed to address the recovery goal of 800 tern adults for 10 years and 485 plover pairs for 15 years. A motion was made and passed that the goal of the group should be to advise the Corps on techniques and methodologies that are implementable for recovery of terns and plovers on the Missouri River.

The group went through an exercise of listing all the potential objectives that the group would have in addressing its goal. After considerable discussion, the activities were incorporated into two objective statements. Objective one was to provide Annual Operating Plan (AOP) recommendations to the Corps through the MRNRC. Included would be looking at fledge ratios, status of reaching bird numbers for recovery plans, evaluation of effects of past operations, evaluating effects of discharges on fledge ratios, possible participation of the Corps in enforcement and public relations activities, and evaluation of yearly production. The second objective was to provide recommendations for productivity and habitat enhancement activities. Included would be most of the above activities plus evaluating long-term habitat trends, evaluating known and proposed protection and habitat improvement techniques, providing enhancement recommendations, developing predator management recommendations, and continuing with status reports and sharing information on who is doing what. After additional thought, a third objective of evaluating the long-term effectiveness of the group in meeting recovery goals for terns and plovers was added.

Considerable time was spent discussing time frames for development of AOPs, reporting of tern and plover production data, and developing Team recommendations for effective consideration. For this year, as a start-up year, the Team will review the Annual Tern and Plover Report prepared by the Service through the Corps in January. Latka is to send out a list of proposed habitat development activities that the Team will review and help prioritize. Each member is to visit with their MRNRC representative about Team concerns and to keep them informed. And, each member is to prepare for the flow meeting in June.

Starting this next year, the group will hold regular meetings in June and October. The June 1993 meeting will be held in Billings, Montana, and the October meeting in North Dakota. Letters and recommendations will be made through the MRNRC chairman after each of those meetings. An Annual Report will be prepared each year by the chairman to be included in the MRNRC Annual Report.

A question arose about travel and whether the Corps or Service would be willing to fund the Team since it is a requisite of the Biological Opinion. The Service received $90,000 this last year from the Corps to work on terns and plovers. A question was asked whether the transfer agreement Scope of Work (SOW) could be utilized to fund the Team. Latka indicated that the Team's expertise would be useful to look at what information is needed and, that, perhaps there was a need for it to look at the SOW document. However, the Corps does not anticipate funding Team participation.

Dave Wooster provided information on anticipated releases at the dams and expected pool levels. Projections were for the remainder of this year and for the 1993 water year. A copy of the handout is attached.

Respectfully submitted,

Kent

Kent Keenlyne
MRNRC Coordinator

Attachments

Attendees of the September 29 and 30, 1992, Tern and Plover Management Team Meeting

NAME	AGENCY
Greg Wingfield	Nebraska Game and Parks Commission P.O. Box 30370; Lincoln, NE 68503 (402) 471-5420
Casey Kruse	U.S. Fish and Wildlife Service, SDSU Coop. Unit P.O. Box 2207; Brookings, SD 57007 (605) 222-1185
Kent Keenlyne	MRNRC Coordinator 420 S. Garfield Avenue, Suite 400; Pierre, SD 57501 (605) 224-8693
Kevin M. Johnson	U.S. Fish and Wildlife Service 1500 E. Capitol Avenue; Bismarck, ND 58501 (701) 250-4414
Nell McPhillips	U.S. Fish and Wildlife Service 420 S. Garfield Avenue, Suite 400; Pierre, SD 57501 (605) 224-8693
Rochelle Renken	Missouri Dept. of Conservation P.O. Box 180; Jefferson City, MO 65102-0180 (314) 882-9880
Dennis Christopherson	U.S. Fish and Wildlife Service 1501 14th Street W., Suite 230; Billings, MT 59812 (406) 657-6750
Randy Kreil	ND Game and Fish Department 100 North Bismarck Expwy; Bismarck, ND 58501 (701) 221-632
Eileen Dowd Stukel	SD Dept. of Game, Fish and Parks Joe Foss Bldg., 523 E. Capitol; Pierre, SD 57501-3181 (605) 773-4229
Sharon Whitmore	U.S. Fish and Wildlife Service 420 S. Garfield Avenue, Suite 400; Pierre, SD 57501 (605) 224-8693
Bruce Jacobson	SD Dept. of Agriculture 445 East Capitol; Pierre, SD 57501 (605) 773-3724
Doug Latka	Corps of Engineers 215 North 17th Street; Omaha, NE 68102 (402) 221-7281

Dennis Unkenholz	SD Dept. of Game, Fish and Parks Joe Foss Bldg., 523 E. Capitol; Pierre, SD (605) 773-5535 57501
Dave Wooster	Corps of Engineers, Missouri River Division P.O. Box 103, Downtown Station; Omaha, NE 68101-0103 (402) 221-7350
John Sidle	U.S. Fish and Wildlife Service 203 W. Second Street, Federal Bldg., 2nd Floor; Grand Island, NE 68801 (308) 382-6468
Stan Zschomler	U.S. Fish and Wildlife Service 420 S. Garfield Avenue, Suite 400; Pierre, SD (605) 224-8693 57501
Dave Allardyce	U.S. Fish and Wildlife Service 420 S. Garfield Avenue, Suite 400; Pierre, SD (605) 224-8693 57501

TERN AND PLOVER MANAGEMENT TEAM
MISSOURI RIVER NATURAL RESOURCES COMMITTEE

The following goals, objectives, and procedures and functions were established by the Tern and Plover Management Team (Team) at a meeting, September 29-30, 1992 at Pierre, South Dakota.

GOAL

Advise Corps of Engineers on techniques and methodologies that are implementable for the recovery of least terns and piping plovers on the Missouri River.

OBJECTIVES

1. Provide Annual Operating Plan recommendations to the Corps of Engineers through the Missouri River Natural Resources Committee (MRNRC).

   ### Strategies

   - Evaluate previous operations and effects on least terns and piping plovers.
   - Evaluate long term habitat trends.
   - Evaluate dam discharge scenarios on least tern and piping plover habitat.
   - Evaluate yearly least tern and piping plover productivity/population levels.
   - Identify interested agencies/persons that need to be informed on least tern and piping plover activities or who can provide assistance or technical expertise to the Team.

2. Provide recommendations for productivity and habitat enhancement activities.

   ### Strategies

   - Evaluate long term habitat trends.
   - Evaluation of known and proposed techniques to enhance habitat and productivity (i.e. fledge ratio goals).

- Predator management recommendations.

- Evaluate participation by Corps of Engineers in law enforcement and public relations.

- Evaluate yearly least tern and piping plover productivity/population levels.

- Status report on least tern and piping plover activities.

- Help Corps of Engineers set funding priorities for least tern and piping plover activities.

- Review Annual Least Tern and Piping Plover Field Report and provide management recommendations to the Corps of Engineers.

- Facilitate Corps of Engineers ability to accomplish suggested management activities.

- Identify interested agencies/persons that need to be informed on least tern and piping plover activities or can provide assistance or technical expertise to the Team.

3. Evaluate long term effectiveness of meeting recovery goals for least terns and piping plovers.

PROCEDURES AND FUNCTIONS

Meetings

- June of every year - approximately the third week.

- October of every year - approximately the first week.

Meetings will be at locations to be rotated among the states. Potential field trips on the Missouri River will be arranged when possible.. The June 1993 meeting is scheduled for Montana and the October 1993 meeting for North Dakota.

Deadlines

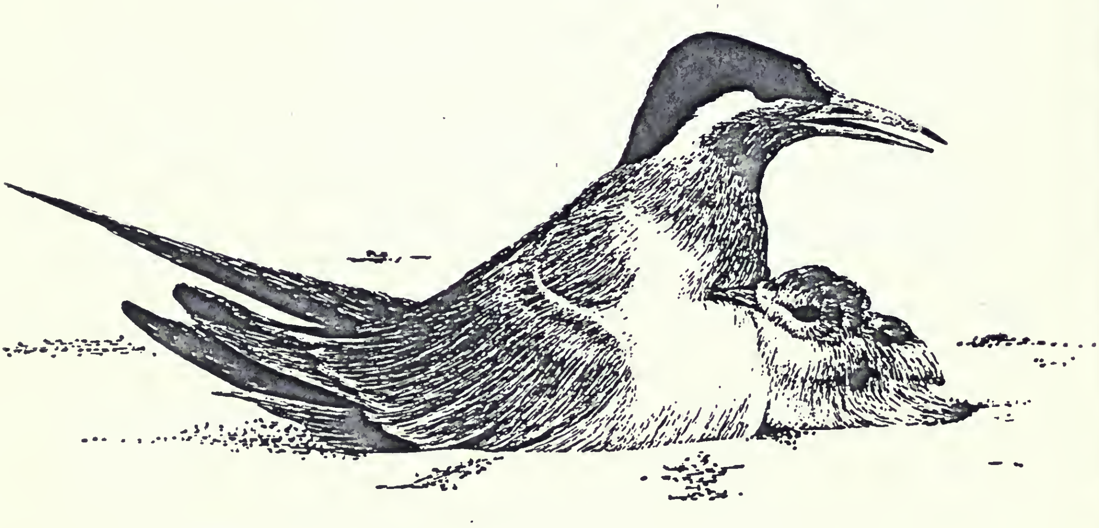
- Tern and Plover Management Team June meeting - Flow recommendations/Annual Operating Plan recommendations provided to the MRNRC by the their August meeting. Products to include a written report and oral presentation to the MRNRC.

- Tern and Plover Management Team October meeting - Review current nesting and operation season data and draft Annual Operating Plan.

Recommendations given to MRNRC to report for the Annual Operating Plan. Procedures to be worked out with MRNRC on how information is to go to the Corps of Engineers.

- Least tern and piping plover report delivered by the Corps of Engineers to the Team by January. Team will review report and any further recommendations will be made to the Corps of Engineers through the MRNRC prior to the March meeting of the MRNRC.
- Annual Report of the Team will be included in the MRNRC Annual Report (usually in December). The Team report will include a compilation of target reports, meeting minutes and a scorecard evaluating the effectiveness of the Team.

RESERVOIR CONTROL CENTER



ata For 29 & 30 September Meeting in Pierr

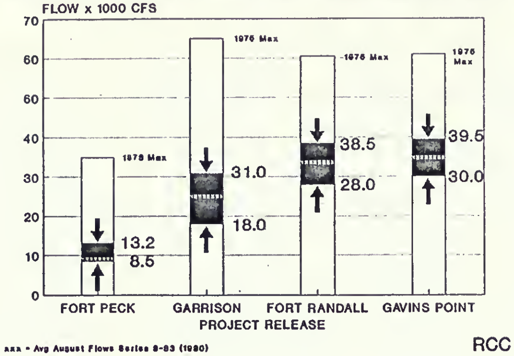
FORECASTED 1993 AVERAGE MONTHLY DISCHARGES (1000 cfs)

	Chance	J	F	M	A	M	J	J	A	S	O	N	D
	1 in 10	9.0	8.0	4.5	6.0	7.5	8.5	8.5	8.0	3.7	3.7	6.5	10.0
	1 in 4+	9.0	8.0	4.5	6.0	8.0	9.0	9.0	9.0	4.1	3.7	5.9	10.0
	Likely	8.0	8.0	3.0	5.0	7.0	9.0	9.0	8.5	4.0	3.0	5.1	9.0
RT PECK	1 in 4-	8.0	8.0	3.0	4.5	6.5	8.0	8.0	8.0	3.6	3.0	5.0	8.0
	1 in 10	8.0	8.0	3.0	4.0	6.0	7.0	7.0	7.0	3.6	3.0	4.3	7.0
	1992	7.8	7.4	8.0	8.2	8.0	8.0	7.2	6.0	3.0	3.0	3.5	8.0
	1 in 10	20.5	21.0	19.0	20.0	22.0	23.0	23.0	23.0	14.7	13.0	14.8	20.0
	1 in 4+	20.5	21.0	16.3	19.0	20.0	22.0	22.0	22.0	14.5	12.5	14.6	20.0
	Likely	20.5	20.0	11.0	14.0	18.0	19.5	19.5	19.5	11.7	10.0	14.8	20.0
RRISON	1 in 4-	20.0	19.0	10.0	12.5	19.5	18.0	18.0	18.0	10.0	10.0	11.5	18.0
	1 in 10	20.0	19.0	10.0	12.5	21.0	18.0	18.0	18.0	10.0	10.0	12.0	18.0
	1992	22.3	20.4	12.6	16.4	19.3	19.4	19.2	18.1	13.4	10.0	11.2	19.0
	1 in 10	11.3	8.6	11.2	20.2	24.1	22.3	28.8	30.5	30.5	29.6	27.1	14.2
	1 in 4+	11.3	8.6	11.2	19.6	23.0	22.8	26.5	28.4	29.2	27.3	25.3	12.2
	Likely	11.5	9.0	11.9	20.3	23.2	23.2	26.2	27.4	27.6	25.8	12.9	10.5
RT RANDALL	1 in 4-	11.8	7.8	11.6	20.4	23.4	23.3	26.2	27.5	27.8	22.3	6.9	10.8
	1 in 10	11.8	7.8	11.6	20.4	23.4	23.3	26.2	27.5	27.8	17.7	7.3	10.8
	1992	10.6	8.3	12.2	20.7	22.8	23.6	21.0	20.4	22.0	15.2	7.4	10.7
	1 in 10	13.0	11.5	13.8	23.0	26.1	26.7	30.7	31.7	32.0	31.0	29.0	15.5
	1 in 4+	13.0	11.5	14.0	23.1	25.9	26.2	29.1	30.1	30.4	29.4	27.3	13.3
	Likely	13.0	11.5	13.9	22.8	25.4	25.4	27.2	28.2	28.5	27.5	15.0	12.0
VINS POINT	1 in 4-	13.0	10.0	13.8	22.8	25.4	25.4	27.2	28.2	28.5	23.8	9.0	12.0
	1 in 10	13.0	10.0	13.8	22.8	25.4	25.4	27.2	28.2	28.5	19.6	9.0	12.0
	1992	13.0	10.9	14.1	22.8	25.0	26.1	23.9	22.1	23.0	19.0	9.0	12.0
		J	F	M	A	M	J	J	A	S	O	N	D

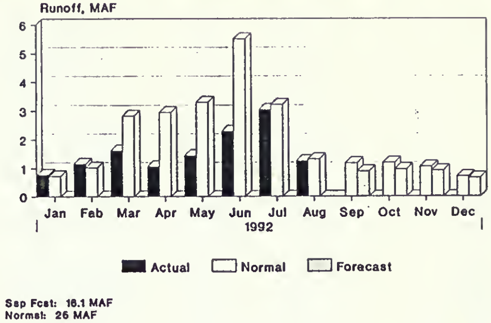
FORECASTED 1993 END-OF-MONTH POOL ELEVATIONS

	Chance	J	F	M	A	M	J	J	A	S	O	N	D
FORT PECK	1 in 10				2216.7	2220.1	2227.0	2231.4	2231.9				
	1 in 4+				2216.9	2220.0	2224.5	2225.9	2225.1				
	Likely				2212.0	2214.4	2218.7	2219.9	2219.3				
	1 in 4-				2210.4	2214.6	2216.7	2216.0	2214.0				
	1 in 10				2210.6	2211.9	2212.5	2211.3	2209.4				
	1992				2215.4	2214.0	2213.1	2212.5	2211.4				
GARRISON	1 in 10				1824.4	1826.7	1834.2	1839.0	1838.7				
	1 in 4+				1821.6	1822.8	1829.4	1832.9	1830.3				
	Likely				1820.2	1821.5	1827.8	1830.2	1829.7				
	1 in 4-				1819.0	1818.9	1822.4	1823.8	1822.8				
	1 in 10				1818.0	1817.7	1821.1	1822.5	1821.4				
	1992				1821.3	1821.4	1823.4	1824.9	1823.0				
OAHE	1 in 10				1604.6	1605.7	1607.6	1607.0	1605.4				
	1 in 4+				1603.0	1603.8	1605.9	1602.4	1604.0				
	Likely				1597.8	1598.1	1600.5	1599.5	1597.2				
	1 in 4-				1594.1	1593.9	1595.2	1593.6	1591.0				
	1 in 10				1593.0	1592.5	1592.1	1590.1	1587.6				
	1992				1591.1	1590.4	1589.8	1590.0	1590.1				
GAVINS POINT	1 in 10				1206.0	1206.0	1206.0	1206.0	1206.5				
	1 in 4+				1206.0	1206.0	1206.0	1206.0	1206.5				
	Likely				1206.0	1206.0	1206.0	1206.0	1206.5				
	1 in 4-				1206.0	1206.0	1206.0	1206.0	1206.5				
	1 in 10				1206.0	1206.0	1206.0	1206.0	1206.5				
	1992				1206.5	1206.2	1206.2	1205.4	1206.7				
		J	F	M	A	M	J	J	A	S	O	N	D

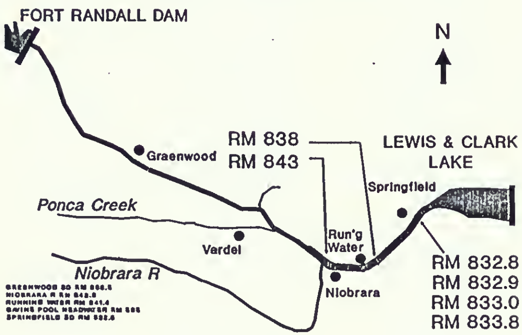
DAILY RELEASE RATE FOR CREATED HABITAT



CY 1992 Missouri River Runoff
Above Sioux City, Iowa



TERN & PLOVER ISLAND ENHANCEMENT
21 thru 25 September 1992



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                                             SEPTEMBER 1, 1992 BASIC FORECAST
                                             Elevations & Storages are for Date Shown
                                             Discharge & Energy are Period Values
                                             Date:    09/02/92

                                            1992                              1993
                        31AUG92    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK -------------
          ELEV FTMSL    2211.4   2211.6   2211.7   2212.0   2210.6   2209.5   2208.8
         DISCH KCFS        6.0      3.0      3.0      3.5      8.0      8.0      8.0

GARRISON --------------
          ELEV FTMSL    1823.2   1822.1   1821.7   1821.2   1819.4   1817.6   1816.4
         DISCH KCFS       18.1     13.4     10.0     11.3     19.0     20.5     20.0

OAHE ------------------
          ELEV FTMSL    1590.3   1590.9   1591.5   1592.2   1592.6   1593.4   1594.5
         DISCH KCFS       17.9     11.4      7.6      7.7     16.3     17.0     15.7

BIG BEND --------------
          ELEV FTMSL    1421.1   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
         DISCH KCFS       16.5     11.5      7.2      7.4     16.1     17.0     15.7

FORT RANDALL ----------
          ELEV FTMSL    1353.7   1345.3   1337.5   1337.5   1342.7   1347.8   1353.0
         DISCH KCFS       20.4     22.5     15.2      7.4     10.7     11.5      9.0

GAVINS POINT  ---------
          ELEV FTMSL    1206.7   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
         DISCH KCFS       22.1     23.5     17.0      9.0     12.0     13.0     11.5

SYSTEM ----------------
      STORAGE 1000 AF    44805    44048    43622    43728    43448    43384    43659
       ENERGY GWH         2606      461      334      276      523      550      462
         PEAK POWER MW             2082     2048     2013     2123     2142     2186
```

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                                             SEPTEMBER 1, 1992 80% OF BASIC FORECAST

                                            1992                              1993
                        31AUG92    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK -------------
          ELEV FTMSL    2211.4   2211.3   2211.1   2211.0   2209.3   2207.9   2206.9
         DISCH KCFS        6.0      3.0      3.0      3.5      8.0      8.0      8.0

GARRISON --------------
          ELEV FTMSL    1823.2   1821.8   1821.0   1820.5   1818.5   1816.5   1815.3
         DISCH KCFS       18.1     13.4     10.0     10.0     18.5     20.0     19.0

OAHE ------------------
          ELEV FTMSL    1590.3   1590.5   1590.8   1591.0   1591.0   1591.6   1592.8
         DISCH KCFS       17.9     12.2      8.2      8.3     16.6     17.3     14.6

BIG BEND --------------
          ELEV FTMSL    1421.1   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
         DISCH KCFS       16.5     12.2      7.8      7.9     16.4     17.3     14.6

FORT RANDALL ----------
          ELEV FTMSL    1353.7   1345.3   1337.5   1337.5   1342.7   1347.8   1353.0
         DISCH KCFS       20.4     22.9     15.6      7.8     11.0     11.8      7.8

GAVINS POINT  ---------
          ELEV FTMSL    1206.7   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
         DISCH KCFS       22.1     23.5     17.0      9.0     12.0     13.0     10.0

SYSTEM ----------------
      STORAGE 1000 AF    44805    43823    43165    43079    42622    42425    42622
       ENERGY GWH         2590      471      343      274      522      550      430
         PEAK POWER MW             2079     2042     2004     2109     2127     2169
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                                             SEPTEMBER 1, 1992 120% OF BASIC FORECAST

                                            1992                              1993
                        31AUG92    30SEP    31OCT    30NOV    31DEC    31JAN    28FEB

FORT PECK -------------
          ELEV FTMSL    2211.4   2211.8   2212.5   2213.2   2212.4   2211.7   2211.7
         DISCH KCFS        6.0      3.0      3.0      3.5      8.0      9.0      8.0

GARRISON --------------
          ELEV FTMSL    1823.2   1822.4   1822.5   1822.4   1821.0   1819.8   1818.8
         DISCH KCFS       18.1     13.4     10.0     11.3     19.0     20.5     21.0

OAHE ------------------
          ELEV FTMSL    1590.3   1591.3   1592.1   1593.1   1593.6   1594.5   1595.9
         DISCH KCFS       17.9     10.6      7.0      7.1     15.9     16.7     15.1

BIG BEND --------------
          ELEV FTMSL    1421.1   1420.5   1420.5   1420.5   1420.5   1420.5   1420.5
         DISCH KCFS       16.5     10.9      6.7      6.9     15.7     16.7     15.1

FORT RANDALL ----------
          ELEV FTMSL    1353.7   1345.3   1337.5   1337.5   1342.7   1347.8   1353.0
         DISCH KCFS       20.4     22.1     14.8      7.0     10.4     11.3      8.6

GAVINS POINT  ---------
          ELEV FTMSL    1206.7   1207.0   1207.0   1207.0   1207.0   1207.0   1206.0
         DISCH KCFS       22.1     23.5     17.0      9.0     12.0     13.0     11.5

SYSTEM ----------------
      STORAGE 1000 AF    44805    44261    44103    44459    44401    44554    45087
       ENERGY GWH         2586      450      325      269      519      559      465
         PEAK POWER MW             2085     2055     2023     2136     2159     2206
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Rare and Endangered Fishes Subcommittee

1992 Chairman's Report

In 1992, the Rare and Endangered Fishes Subcommittee completed a list of 29 Missouri River fish species listed by state and federal agencies as rare and/or endangered. Brief descriptions of each species were also produced.

Upon completion of the list, I was not sure how to proceed. I questioned, "Where does the Subcommittee go from here?" A definite lack of direction existed. It appeared the Subcommittee needed some type of plan to direct its activities and move into action.

In order to determine a direction in which to proceed, I reviewed MRNRC minutes to ascertain what the Committee envisioned that the Subcommittee would do. The original tasks identified were to coordinate activities, identify research needs, facilitate data gathering, and examine issues. Development of a list of rare and endangered fish and protocols for handling these species when they are encountered in the field were also identified as potential Subcommittee tasks.

I contemplated how the Subcommittee would perform these tasks. In examining the species list, it was apparent that listing criteria and species classifications did not always coincide from state to state along the river. The true status of many of these species in the Missouri River was not known. I surmised that the Subcommittee was probably somewhat ill-prepared to carry out the original charges given it because of a lack of consolidated information to rely upon for decision-making. In an attempt to define goals and objectives for the Subcommittee, I drafted a possible plan of action and sent it out for review. The plan involved an effort to gather and compile all available Missouri River information on identified species, maintain it in permanent file locations, and set up a program to gather new information. The plan also involved the development of a publishable compendium of information from the compiled data.

The overall plan concept was well received by Subcommittee members; however, comments/suggestions indicated that the plan needed to be much broader in scope. Therefore, to insure that the direction taken and that the plan established reflects the goals of all Subcommittee members, I plan to hold a meeting, preferably prior to MRNRC's Spring Meeting, to work out details.

I believe this Subcommittee has great potential to make a difference on the Missouri River. However, if it is to ever become active and play a significant role on the river, a strategy needs to be developed. It is up to the members to determine "how" and "what." The Subcommittee can utilize the plan I drafted as a basis and build upon it or they can elect to start from scratch and choose a different approach. In any case, I am confident that the MRNRC will be willing to support and promote the approach that the Subcommittee decides to take.

Immediate plans for 1993 involve organizing the first meeting of the Subcommittee to develop the plan. To accomplish this, I plan to draw upon the expertise and experience that exists on the Subcommittee to come up with a quality set of guidelines. I plan to present the results to the MRNRC at their spring meeting. Subsequent Subcommittee actions for the year will be dependent upon the outcome of these meetings!

List, by State, of rare, threatened, and endangered endemic fish species of the Missouri River floodplain (Revised Aug. 3, 1992)

	STATE STATUS							FEDERAL STATUS
SPECIES	MT	ND	SD	NE	IA	KS	MO	
Lake Sturgeon (*Acipenser fulvescens*)				T	E		E	C2 - SD,NE,IA,KS,MO
Pallid Sturgeon (*Scaphirhynchus albus*)	S1	E	E	T	E	E	E	E - all 7 States
Sturgeon Chub (*Macrhybopsis gelida*)	S3	W	T				R	C2 - all 7 States
Sicklefin Chub (*Macrhybopsis meeki*)	S1	W	T			E	R	C2 - all 7 States
Flathead Chub (*Platygobio gracilis*)						T	E	
Lake Chub (*Couesius plumbeus*)		W						
Paddlefish (*Polyodon spathula*)	S3	W	R				WL	C2 - all 7 States
Blue Sucker (*Cycleptus elongatus*)	S2					C	WL	C2 - ND,SD,NE,IA,KS,MO
Crystal Darter (*Ammocrypta asprella*)							E	C2 - IA,MO
Alabama Shad (*Alosa alabamae*)							R	
Short-nosed Gar (*Lepisosteus platostomus*)	S1	P						
Black-nosed Shiner (*Notropis heterolepis*)		P		T	T			
Silverband Shiner (*Notropis shumardi*)						T		
Ghost Shiner (*Notropis buchanani*)							WL	
Topeka Shiner (*Notropis topeka*)							SU	C2 - SD,IA,KS,MO
Pearl Dace (*Margariscus margarita*)	S2	W	E	T	E			
Finescale Dace (*Phoxinus neogaeus*)	S3	P	T	T				
Northern Redbelly Dace (*Phoxinus eos*)	S3	W	T	T				
Highfin Carpsucker (*Carpiodes velifer*)							R	
Mooneye (*Hiodon tergisus*)							R	
Trout-Perch (*Percopsis omiscomaycus*)	S1		T					

SPECIES	STATE STATUS							FEDERAL STATUS
	MT	ND	SD	NE	IA	KS	MO	
Chestnut Lamprey (*Ichthyomyzon castaneus*)						T		
Burbot (*Lota lota*)					T			
Brassy Minnow (*Hybognathus hankinsoni*)							R	
Banded Killifish (*Fundulus diaphanus*)			E					
Plains Killifish (*Fundulus zebrinus*)							R	
Plains Topminnow (*Fundulus sciadicus*)		P	T				SU	C2 - ND,SD,NE,IA,KS,MO
Flathead Catfish (*Pylodictis olivaris*)		WL						
Montana Fluvial Arctic Grayling (*Thymallus arcticus montanus*)	S1							C2 - MT

STATE STATUS CLASSIFICATIONS

E	- Endangered
T	- Threatened
W	- Watch species
P	- Peripheral; edge of range
R	- Rare
C	- Species in need of conservation
WL	- Watch species
SU	- Status unknown
S1	- Critically endangered
S2	- Endangered
S3	- Threatened

FEDERAL STATUS CLASSIFICATIONS

E	- Endangered
T	- Threatened
C1,C2,C3	- Species recognized as potential candidates for listing

C1 - Species for which the Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Also included in category 1 are species of known vulnerable status in the recent past that may already have become extinct.
C2 - Species for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time. Further biological research and field study usually will be necessary to ascertain the status of the species.
C3 - Species that once were considered for listing as threatened or endangered but are no longer under such consideration. Category 3 species are *not* candidates for listing and are further subdivided into three subcategories to indicate the reason(s) for their removal from consideration.

MISSOURI RIVER RARE AND ENDANGERED FISH

General Descriptions

Lake Sturgeon (Acipenser fulvescens) - The lake sturgeon is a primitive fish that is largely cartilaginous and has a body that is covered with bony plates. It has a cone-shaped snout under which is a sucker-like mouth and long sensory barbels ideally suited for this bottom-dwelling fish that can reach up to 7 feet in length. It lives in large, moderately clear rivers and lakes with firm, sandy, gravelly, or rocky bottoms. Solely a freshwater sturgeon, it occurs in the Great Lakes, Upper Mississippi River and Missouri River drainages and Saskatchewan and Hudson Bay drainages. The lake sturgeon has been severely depleted over much of its range as a result of overfishing, pollution, and dams that block migration.

Pallid Sturgeon (Scaphirhynchus albus) - One of the largest freshwater fishes in North America, this sturgeon was not recognized as a species until 1905; therefore, little is known about its early history. The pallid sturgeon looks very similar to the more common shovelnose sturgeon but can attain a much larger size, is usually lighter in color, has no bony plates on its belly, bony plates covering the body are less prominent, and the base of the two longer outer barbels is slightly farther back than the two much shorter inner barbels. Exceedingly rare, this bottom-dweller is principally confined to the Missouri River and lower Mississippi River which were at one time large silt laden rivers with a strong current and a firm, sandy, or gravelly bottom. The pallid sturgeon matures very slowly. Females do not reach reproductive maturity until 10+ years and require very specific environmental conditions to spawn. Because of major habitat alterations within its range, lack of reproduction, and other factors, the sturgeon's future is uncertain.

Sturgeon Chub (Macrhybopsis gelida) - This small member of the minnow family seldom exceeds 3 inches in length, is light brown to light green above with many fine dark specks, and has a sucker-like mouth with barbels at the corners. This fish is adapted for a life in turbid waters. Its eyes are reduced in size, and it has abundant tastebuds located on the head, body, and fins that are used in locating food. It occurs in large, silty rivers with swift current and fine gravel or sand bottoms. Its range includes large tributaries of the Missouri River drainage from Montana to the Mississippi River drainage on to the Ohio River. This fish has undoubtedly been affected adversely by the major alterations that have occurred throughout the majority of its range.

Sicklefin Chub (Macrhybopsis meeki) - This small, silvery minnow has a dusky lateral band, averages 3 inches, and has very large fins proportionally, especially the pectoral fin that is sickle-shaped and larger than that of other barbeled minnows. The sicklefin chub is highly specialized for life in turbid rivers. Its eyes are much reduced and partly covered by skin. Its range is from the Missouri River and the lower reaches of its largest tributaries from Montana to the Mississippi River downstream to the mouth of the Ohio River. Channelization and damming have greatly altered the majority of this fish's habitat.

Flathead Chub (Platygobio gracilis) - A slender, silvery minnow with long pointed pectoral fins, the flathead chub can reach up to 12 inches and averages about 5.5 inches in length. It finds its food by external tastebuds in turbid water or by sight in clear water and lives 3 to 4 years. It occurs in silty rivers with strong current and bottoms of sand and fine gravel or in pools of small creeks having moderately clear water, little current, and bottoms of coarse gravel or bedrock. It is frequently found in association with sturgeon chub. It can be found in rivers and streams from the Yukon Territory south to Oklahoma, but is most abundant in parts of the Missouri River and lower Mississippi River drainages.

Lake Chub (Couesius plumbeus) - A larger, barbeled minnow, the lake chub is dusky colored with an obscure lateral band and averages about 4 inches in length. A merging of the genus Couesius with the genus Hybopsis (former genus of sicklefin and sturgeon chub, was changed to Macrhybopsis in 1991) was proposed by Bailey (1951) and resulted in acceptance by many workers but not all. The lake chub occurs in large lakes and rivers widely throughout Canada and in scattered localities in the northern United States, from northern New England to New York, Michigan, Iowa, Wisconsin, Minnesota, the Dakotas, Montana, Wyoming, Colorado, and Idaho. It is important as a forage fish and is captured for sale as bait.

Paddlefish (Polyodon spathula) - A relic from the past, this unusual looking fish is largely cartilaginous and can reach up to 160 pounds in weight. This almost black, scaleless fish has a long, paddle-shaped snout whose function is uncertain. One of the largest freshwater fish, its only living relative, Psephurus gladius, is found in the Yangtze Valley in China. During most of its life the paddlefish inhabits slow-flowing water rich in zooplankton, its main food source. It filters water through its large, toothless mouth extracting microscopic plants and animals with its gill rakers. To spawn, it must have access to a large, free-flowing river with gravel bars subject to sustained inundation during spring floods. Larger streams and connected waters of the Missouri and Mississippi Rivers, provided the necessary habitat until they were drastically altered. Overharvest and habitat destruction have greatly reduced the paddlefish population.

Blue Sucker (Cycleptus elongatus) - The blue sucker is dark blue during spawning and olive colored with blue fins during most of the year. It has a small head and long, sickle-shaped dorsal fin and can reach up to 2 feet in length. Its mouth is small, horizontal, overhung by the snout, and covered by wartlike papillae during the spawning season. It lives in deep, swift channels of large rivers over a bottom of sand, gravel, or rock. It tolerates high turbidity if there is sufficient current to prevent siltation. The blue sucker is rare but widespread in the Missouri and Mississippi Rivers and the lower portions of their larger tributaries. The construction of dams that permit siltation is one of the main reasons this fish is in trouble.

Crystal Darter (Ammocrypta asprella) - This slender, pale yellow member of the perch family can reach a maximum length of about 3 inches. Darters are not well known to most people and are frequently mistaken for the young walleye they resemble. The crystal darter occurs in open stretches of large, clear streams of low to moderate gradient with bottoms of sand or small gravel and a slight current. Occurrence within its range, which is southern Minnesota to southern Ohio and south to Alabama and Oklahoma, is now sporadic.

Alabama Shad (Alosa alabamae) - A member of the herring family, this shad is characterized by a saw-toothed edge on the belly and very flat sides. The Alabama shad looks very similar to the American shad. It is bluish or greenish with silvery reflections, silver sides and belly, and can attain a length of about 18 inches. This shad is anadromous, spending most of its life at sea. It enters fresh water only to spawn in swift water in late spring or early summer, after which it migrates elsewhere. No present commercial fishery exists for the Alabama shad, and it is seldom taken by fishermen since it does not feed in fresh water. It spawns in the Mississippi River and lower reaches of the Missouri River. In the 1900's its numbers supported a limited commercial fishery which resulted in a marked decline in population.

Short-nosed Gar (Lepisosteus platostomus) - A primitive fish with a skeleton composed mostly of cartilage, gars have long, cylindrical bodies, heads that are covered with bony plates, and long jaws with many sharp teeth. The short-nosed gar is brown to olive colored, is smaller with a shorter, broad snout than the other gars, and can reach a length of about 3 to 4 feet. It inhabits major rivers in quiet pools, backwaters, and oxbow lakes and is more tolerant of high turbidity than other gars. It occurs from the Great Lakes and Mississippi Valley to Nebraska and Texas and the Missouri River through the Ohio Valley and south to Alabama and Texas.

Black-nosed Shiner (Notropis heterolepis) - A slender, silvery minnow with large eyes and a small, nearly horizontal mouth, the black-nosed shiner averages about 2 inches. It has no barbels like the chubs, has distinct horizontal stripes along its sides, and scales that are edged in black. It is intolerant of continuous turbidity and prefers slack, heavily vegetated pools or streams overlying sand, gravel, or rock, such as backwater areas of rivers and streams or small prairie streams with large amounts of aquatic vegetation and organic debris. Its range extends from southern Canada from Saskatchewan to Nova Scotia, Maine, and eastward through the Ohio River drainage. A decrease in this fish's preferred habitat has resulted in the scarcity or disappearance of this minnow in many areas.

Silverband Shiner (Notropis shumardi) - A silvery, moderately deep, slab-sided minnow, this shiner has an unusually high, pointed dorsal fin. It has large eyes, a terminal, oblique mouth, no barbels, averages about 2 inches, and has a faint stripe along its midline. It lives in schools, often with other shiners, in open channels of large rivers with a moderate to strong current over sand or fine gravel. It is found in the Missouri and Mississippi Rivers and only rarely in lower portions of their larger tributaries southward in the Mississippi basin into Oklahoma, Louisiana, Texas, and the Mobile Bay drainage. Habitat changes throughout the majority of its range have undoubtly adversely affected this shiner.

Ghost Shiner (Notropis buchanani) - This small shiner resembles other shiners in having large eyes, a small oblique mouth, and deep, slab sides, except it is very pale, yellowish white, and has no dark markings of any kind. It lives in schools in midwater with other shiners and spawns over sluggish riffles of sand or fine gravel. It inhabits prairie streams from Iowa through the Ohio River south to Alabama and west to Texas and Mexico and in the Missouri and Mississippi drainages in Missouri. Increased siltation and a tendency for smaller prairie creeks to dry up as a result of cultivation has adversely affected the ghost shiner.

Topeka Shiner (Notropis topeka) - This chubby, slab-sided minnow has moderately small eyes, a small oblique mouth, no barbels, a tail fin with a small wedge-shaped black spot at the base, a dark stripe along the back, and a distinct dusty stripe along the midside. The males have bright orange fins during mating. They live in quiet pools of small, clear upland creeks with bottoms of sand, gravel, or rubble. Presently, they are restricted to large tributaries of the Missouri River with sufficient gradient to prevent deposition of silt. Their range is from South Dakota to southern Minnesota to Kansas and Missouri. Increased siltation as a result of cultivation and river alteration has reduced critical habitat of the topeka shiner.

Pearl Dace (Margariscus margarita) - This small minnow averages about 3.5 inches in length has a dusky mottled appearance, small scales, and is closely related to the more common creek chub. The males are reddish in color in the spring during breeding. This fish lives in cold bog ponds, creeks, lakes, and smaller tributaries of larger rivers. Its range extends from the eastern Great Lakes drainage and Vermont southward to Virginia east of the Allegheniies.

Finescale Dace (Phoxinus neogaeus) - This robust minnow that can reach up to 5 inches in length resembles the northern redbelly dace, except it has only one lateral band instead of two. Breeding males have a bright red band on the sides. There is some discrepancy among references with the use of the genus Phoxinus, and it is listed as Chrosomus by some sources. The finescale dace lives in bog lakes and streams from northwestern Canada to New Brunswick and New England south to Montana, northern Minnesota, Wisconsin, and Michigan. There are also populations in the lower Mississippi River, Colorado, Nebraska, and South Dakota. This species proves to be a good bait minnow because it is very tolerant to crowding. It is used extensively as a bait minnow in Minnesota.

Northern Redbelly Dace (Phoxinus eos) - Also known as Chrosomus eos, this minnow has two lateral bands on its sides with a cream or reddish interspace. It hybridizes with the finescale dace and is commonly used as bait in Minnesota. It inhabits streams and bog lakes and is therefore rare in many states because of its need for specific habitat. Its range is from northern British Columbia to Hudson Bay drainage and Novia Scotia south to Montana, Colorado, and Minnesota and to Pennsylvania. Isolated populations exist in Nebraska, South Dakota, Colorado, and Wyoming. Anything that would affect spring fed streams would adversely affect this dace.

Highfin Carpsucker (_Carpiodes velifer_) - The highfin carpsucker belongs to the family Catostomidae, which is closely related to the minnow family. It is soft rayed, has a sucker-like protractile mouth with thick lips, and has a scaleless head. The principal ray of this silver colored bottom feeder's dorsal fin is very long averaging 9 inches to 10 inches. It inhabits clear water with a firm bottom and is not tolerant of turbidity and siltation. It occurs from southern Minnesota and Iowa east to the Ohio River drainage, south through Tennessee to the Gulf Coast drainage of Alabama, and from Mississippi to eastern Texas and north through the Missouri River drainage to Nebraska. This carpsucker's numbers have decreased to a large extent because of its intolerance to turbidity and siltation.

Mooneye (_Hiodon tergisus_) - A thin bodied, silvery fish that reaches about 10 inches in length, the mooneye looks a lot like a herring but lacks the sawtoothed margin on the belly. It most closely resembles the goldeye having the same small head and large eyes. It inhabits open water of large rivers and reservoirs preferring clearer, quieter water than goldeye. It moves up streams to spawn. It occurs in most areas where goldeye are found from Hudson Bay to the St. Lawrence drainage and southward into Arkansas and Alabama. In the past, mooneye were caught in large numbers in commercial seines which greatly reduced its numbers in certain areas. It is considered a rough fish by most anglers but is no doubt an important prey fish for more sought after species.

Trout-Perch (_Percopsis omiscomaycus_) - The trout-perch is a small perch-like fish with spiny fin rays and a trout-like adipose fin. It averages 3-5 inches in length and has a life span of about 4 to 5 years. Resembling a small walleye, it is straw colored to almost transparent with silvery reflections and has distinct, longitudinal rows of dark spots. The trout-perch is a nocturnal, bottom feeder that inhabits lakes and turbid streams. The species is widely distributed in lakes and streams of central and northern North America ranging from the Great Lakes region and the upper Mississippi and Missouri River drainages northward through Canada and into Alaska. An important forage species for many fish, the trout-perch was, no doubt, more abundant prior to the modification of many of the lakes and streams within its range.

Chestnut Lamprey (_Ichthyomyzon castaneus_) - The chestnut lamprey is a small, parasitic lamprey. Primitive, jawless fish with scaleless, boneless eel-like bodies, a lamprey's life cycle consists of two distinct stages, a larval stage and an adult stage. Adults are dark grey to olive or yellow-brown above and lighter below, live up to 18 months, reach a maximum length of less than 12 inches, and are inactive during the winter commencing to parasitic feeding in the spring. They attach themselves to a host fish with their sucker-like mouth filled with horny teeth and rasp a hole for gorging on the blood and tissue. The parasitic adult stage is found in large rivers and reservoirs moving to moderate-sized rivers to spawn. Adults deposit eggs in nests made on the bottoms of swift streams and die soon after spawning. The eggs hatch into larva (ammocoetes) that have undeveloped eyes and no sucking disc and spend an estimated 5-7 years living in the bottoms of streams filter-feeding on minute invertebrates and plants before metamorphosizing into adults. Restricted to central North America, the chestnut lamprey is found in the

Mississippi River from Louisiana and Mississippi northward through Oklahoma, Arkansas, Missouri, and Illinois and in the Missouri River drainage of Missouri and Kansas.

Burbot (Lota lota) - The burbot is the only species of freshwater cod and can weigh up to 12 pounds. It has a body shape that is eel-like and moves with a serpentine type motion. Its color is mottled brown, it is smooth skinned, has a dorsal and anal fin that runs nearly half the length of its body, and has a single, large barbel in the middle of its chin. During the day it is secretive and hides under rocks; at night it forages voraciously on all types of fish. It spawns in the winter. It inhabits large, northern lakes and streams from the Great Lakes region and extreme northern Mississippi drainage of Wisconsin and Minnesota and the Missouri River drainage northwest into Alaska and Siberia.

Brassy Minnow (Hybognathus hankinsoni) - This small, brassy-yellow colored minnow with a dark stripe on its back and no midline stripe averages about 3.5 inches long. It is an algae eater that lives on the bottom of small moderately clear prairie pools and feeds on layers of organic-rich ooze. It is frequently caught for use as bait but is not as hardy as the more commonly used fathead minnow. It ranges from Montana to Lake Champlain, south to Nebraska, Missouri and Colorado and is common in drainages in Minnesota.

Banded Killifish (Fundulus diaphanus) - A small, olive colored fish with silver sides and about 20 darker vertical bands, the banded killifish has a protruding jaw and a mouth that is well-developed for surface feeding. Its average length is about 3 inches. The fins are rather plain except in breeding males where fins are distinctly colored. It inhabits quiet waters of lakes and ponds with submerged vegetation to muddy streams with no vegetation feeding mostly on invertebrates near the water's surface. Subspecies of the killifish have been described in Canada, and in the U.S., is often referred to as the eastern or western banded killifish. It occurs from South Carolina north into Canada and west through New York, Pennsylvania, and southern Canada in the Great Lakes basin, to the Yellowstone River in eastern Montana.

Plains Killifish (Fundulus zebrinus) - The plains killifish is a silvery topminnow with vertical streaks on its sides and averages about 1.5 inches to 3 inches long. It has a protruding lower jaw that is adapted for surface feeding. Breeding males turn a bright yellowish-orange. It inhabits alkaline streams or saline waters that few other fish can tolerate, to pools and backwaters, to shallow, sandy areas with considerable current. During periods of inactivity, it lies buried in the sand with only its head showing. It spawns after heavy rains when there is a large influx of fresh water. The plains killifish occurs from South Dakota and Wyoming south to Texas; they are abundant in Salt Creek in Missouri where salinity is high. A need for high salinity and/or inability to withstand competition from diverse fish populations has threatened this fish.

Plains Topminnow (Fundulus sciadicus) - The plains topminnow has no prominent bars, streaks or stripes as does other members of the topminnow family. It has a protruding lower jaw and anteriorly-placed mouth adapted for surface feeding. A small, olive-brown fish with bronze reflections and faint blue-green crosshatching, it reaches a maximum length of about 3 inches. As with other members of the family, the sexes are often well marked and distinct with breeding males displaying orange or red fins. It inhabits quiet pools of small creeks and backwaters, and overflow pools of larger streams. Two separate populations exist, one that is centered in Nebraska extending into Nebraska, Colorado, eastern Wyoming and southern South Dakota and one that is centered in southeastern Missouri extending into southeastern Arkansas and northeastern Oklahoma.

Flathead Catfish (Pylodictis olivaris) - The flathead catfish is a scaleless, heavy-bodied fish with a flat head, sharp heavy pectoral and dorsal spines and long, slender barbels near the mouth. It is yellowish brown above, pale grey below and often mottled with brown or black. A popular game and food fish, the species can weigh over 100 pounds. A nocturnal, opportunistic feeder that eats mostly fish, the catfish has many external taste buds especially on the barbels. After eggs are laid in a nest prepared by the male under logs, stumps or brush piles in quiet water, the male guards the nest until the young hatch. The flathead inhabits large sluggish rivers and large low-gradient tributaries of the entire Mississippi River drainage and was introduced into the lower Colorado River where they are now common. One of the most abundant of the larger catfish in the Mississippi and Missouri Rivers, the flathead catfish, along with all other catfish species, was recently removed from commercial fishing lists in the Missouri River states of Kansas, Nebraska, Missouri, and Iowa due to dwindling populations.

Montana Fluvial Arctic Grayling (Thymallus arcticus montanus) - A member of the trout family, the Montana fluvial arctic grayling is readily distinguished from other salmonids by its large sail-like dorsal fin. It is a strikingly-colored fish with a body that is iridescent purplish gray and silver sprinkled with small spots and a dorsal fin that is edged with rose or orange and has rows of bluish spots. It reaches a length of 18 inches or more, eats mostly terrestrial insects taken at the water's surface and spawns in shallow water on clean gravel in the spring. The only species of grayling found in North America, it is found in clear cold streams and lakes from Hudson Bay westward into Alaska. In the contiguous United States, isolated populations are found in the headwaters of the Missouri River in Montana and in several locations in Michigan. The Montana grayling population has for years been the main source of stock for various northern waters. Ease of capture, late maturity and slow growth, and loss of clear, cold unpolluted water, has endangered them in many areas.

Coordinator's Report

1992

This year marks a year of reflection. The Coordinator was asked at the Spring Meeting to make an analysis of the effectiveness of the organization and report back to the Committee in August. This was an appropriate effort to mark the first five years of existence of the Committee. The review required revisiting the goal and objectives of the Committee and analyzing where the Committee has focused its attention. The review revealed that the Committee was addressing some of its objectives but not others. The written review is attached to the notes for the Summer Meeting.

The review was a positive step by the Committee. The result was to initiate a strategic planning exercise in 1993 to revisit goals and objectives and to lay out strategies to address revisited and reprioritized objectives. After five years of coordinating experience, the Committee is in a much better position to address strategic planning needs. Such planning is particularly important as the Committee continues to add subcommittees and as an exercise in defining future data needs to better manage the river while the Master Manual for operation of the system is being rewritten.

The Committee also took an important step this year in establishing a framework for addressing endangered species needs and deliberations along the river. Several years of observations document declining numbers of the federally listed least terns and piping plovers. The Committee was asked to assist in coordinating recovery efforts for these species along the Missouri River. A subcommittee was established in March, state and federal members and representatives were identified, and organizational meetings held. The subcommittee has a formidable job ahead trying to identify opportunities to aid the birds and to find mixes of authorities which can be used to improve habitat for them. The continuing drought has provided opportunities in recent years to provide additional sandbar habitat which is not available in years of "normal" operations. Several years of lower than normal releases, however, has also allowed vegetation to reclaim much of the barren areas which are used by the birds in nesting. Once storage is recovered, normal releases will inundate most of the remaining nesting habitat for several successive years. Such a scenario paints a dim future for the birds. The subcommittee will necessarily have to look at long term solutions as well as provide for annual recommendations.

As we enter this last year of rotation of state chairmanship, it is appropriate for the Committee to revisit the resource needs of the river and to identify what the Committee can do to further those needs. This year, the Bureau of Reclamation joined the Fish and Wildlife Service, Corps of Engineers, and Western Area Power Administration as a federal cooperating agency. The Committee is taking an expanded role in providing for better coordination, better communication, and better cooperation in management of this valuable resource. We sit on the doorstep of a new era for the river. The Committee has the structure and expertise necessary to ask the important questions that must be answered in order to manage this vast resource.

Work of the Committee, and the development of a strategic plan for Missouri River resources, will become even more critical in the years ahead. As decisions affecting operation of the system are moved from Omaha to Cincinnati under the Corps' reorganization plan, a single professional resource voice will carry much more weight. A responsible approach toward resolving resource management conflicts will ensure this Committee a voice in the future of this resource we all care so much about.

CONSTITUTION OF THE MISSOURI RIVER NATURAL RESOURCES COMMITTEE

The Missouri River Basin States, of these United States, establish this Constitution of the Missouri River Natural Resources Committee in order to promote and ensure the good stewardship of the Missouri River.

The following Articles of this Constitution shall describe, define, and delineate this organization by structure and function.

Article I - The name of the organization shall be the Missouri River Natural Resources Committee, hereinafter referred to as the Committee or the MRNRC.

Article II - The objectives and purposes of the Committee shall be:

1. To facilitate a systems approach to managing the natural resources of the Missouri River.
2. To promote preservation, wise utilization, and enhancement of the natural and recreational resources of the Missouri River.
3. To formulate policies, plans, and programs for carrying on cooperative research and management studies for the above-stated purposes.
4. To keep necessary records on consumptive and recreational use, and to publish and distribute reports.
5. To recommend to the governing state bodies activities and programs which further the Committee objectives.
6. To provide coordinated recommendations to appropriate agencies on the operation and maintenance of the Missouri River main stem management.
7. To make coordinated research and study proposals to appropriate management and approval agencies in furtherance of the Committee objectives.

Article III - Membership and Meetings

1. Membership

The membership of the Committee shall be the following classes:

a. Official Members and Delegates - The official members (seven) shall be: (1) Montana Department of Fish, Wildlife and Parks; (2) North Dakota Game and Fish Department: (3) South Dakota Department of Game, Fish and Parks: (4) Nebraska Game and Parks Commission: (5) Iowa Department of Natural Resources: (6) Kansas Department of Wildlife and Parks: and (7) Missouri Department of Conservation. The appointed delegates shall constitute the Committee. Each official member shall be represented by a delegate appointed by the responsible administrator (director or commissioner) of the said agency. This delegate shall be a person having knowledge of and interest in the Missouri River resources and shall be a person of responsible administrative authority who can make decisions on behalf of his agency provided the same are not contradictory to its policies and do not exceed its financial limitations.

b. Ex-Officio Members and Delegates - The U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers will serve as ex-officio members on the Committee. The ex-officio members shall appoint delegates as the Service Regional Directors or the Division Engineer deems appropriate. This delegate(s) shall be a person having knowledge of and interest in Missouri River resources. An ex-officio delegate can fully participate in Committee discussions but will not be an official voting member on Committee decisions.

c. Cooperating Agencies - Other governmental agencies and private organizations interested in the resources of the Missouri River may serve as cooperating agencies with Committee approval. Such approved agencies may appoint members as they deem necessary and proper to aid the work of the Committee.

2. Meetings

a. Regular - The Committee shall hold regular meetings at times and places determined by the Committee.

b. Special - A special meeting may be called by the Chairman at the request of four or more official members.

Article IV - Offices and Committees

1. The officers of the MRNRC shall be the Chairman and the Chairman-Elect. The Chairman shall serve a one-year term. The Chairman-Elect shall also serve a one-year term, and succeed to the Chairmanship without further election. The Chairmanship and Chairman-Elect will be rotated in the following order: Iowa, Montana, Kansas, North Dakota, Missouri, South Dakota, and Nebraska. In the event of the resignation of an officer, that member (agency) represented shall appoint a replacement for the unexpired term. Only official delegates shall be eligible to serve as elected officers.

2. The U.S. Fish and Wildlife Service shall provide a Coordinator to the Committee.

3. Committees -

   a. Official Committee - The Chairman, Chairman-Elect, and the official delegate from each state not represented by an officer shall constitute the Official Committee. Each state will have one vote (the state designee) on issues where a vote is required. The U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service may name ex-officio members to the Committee.

   b. Standing Committees - The Committee shall have authority to establish Standing Committees to investigate an assigned subject and report at the regular meetings. New Standing Committees can be established by the Official Committee and existing Standing Committees disbanded if their work is deemed complete.

   c. Ad Hoc Committees - The Chairman shall appoint Ad Hoc Committees for special assignments. An Ad Hoc Committee is a temporary committee with a short-term assignment. It shall be terminated upon presentation and acceptance of its report.

Article V - Procedures

1. Roberts Rules of Order shall be followed in all meetings.

2. Motions and seconds may be made by the official state delegate or his designee.

3. Each official member shall be entitled to only one vote.

4. The presence of five of the seven official members shall constitute a quorum, and four affirmative votes will be necessary to pass a motion. Proxy, mail ballot, or telephone vote will be permitted.

BYLAWS

1. Duties of Officers

a. Chairman - The Chairman is responsible for the business of the MRNRC, makes appointments to any Ad Hoc Committees, and exercises such other functions as may be determined from time to time by action of the members. The Chairman shall provide for and shall preside at the annual meeting, at any special meetings, and at meetings of the Official Committee.

b. Chairman-Elect - The Chairman-Elect shall assume the duties of the Chairman in the Chairman's absence or inability to act. The Chairman-Elect shall be prepared to take over the duties of the Chairmanship when becoming Chairman.

c. Coordinator - The Coordinator answers to the Chairman, who speaks for the Committee. The Coordinator shall assist the Chairman in furthering the goals and objectives of the MRNRC, organizing the Committee's activities, and coordinating among member agencies of the Committee, other federal, state, and local agencies, and the public. The Coordinator shall also be required to perform specific tasks associated with the administration of the Committee, such as:

(1) Maintain the administrative record of all Committee activities.

(2) Manage the development of information and reference documents, with such responsibility to include oversight of all records, documents, and publications that are to be either prepared or adopted by the Committee.

(3) Supervise the development of coordinated natural resource plans.

(4) Prepare for publication the Proceedings of the Annual Meeting and other publications and publicity materials as the Committee may direct.

(5) Serve as the Chairman's representative at meetings and conferences, and at Ad Hoc Committee meetings, as appropriate.

2. Ex-Officio Agencies

Representatives of ex-officio agencies are encouraged to assist the Committee in coordinating activities and in supplying such services and information as may assist the Committee to achieve its objectives. Representatives of the ex-officio agencies may serve as members of Standing or Ad Hoc Committees, present reports, and participate in discussions at annual and special meetings.

3. Responsibilities of Committees

   a. Official Committee - The Official Committee of the MRNRC shall meet at least annually. Additional meetings may be called upon approval by representatives of the member states. Actions of such urgency that cannot be deferred until the next regularly scheduled meeting may be decided via conference call or emergency meeting. A full report of all such actions shall be included in the Chairman's report at the next annual meeting. The Official Committee may call on the coordinator and ex-officio member agencies for assistance.

   b. Ad Hoc Committees - Ad Hoc Committees shall be appointed by the Chairman as needed.

4. Order of Business -

   The order of business at the annual meeting of the Committee shall include, but shall not necessarily be limited to, the following:

   a. Call to order by the Chairman.

   b. Roll call and determination that a quorum is present.

   c. Approval of minutes of the previous meeting.

   d. Report of Chairman on actions of Committee.

   e. Report of Coordinator.

   f. Reports of Standing Committees and recommendations to the Committee for later consideration.

   g. Reports of any Ad Hoc Committees.

   h. Old business.

   i. New business.

   j. Installation of newly-elected officers.

   k. Appointment of committees.

   l. Adjournment.

5. Amendments to Constitution and Bylaws

   The Constitution and Bylaws may be amended at any annual or special meeting by unanimous vote of all official members.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

4-18-88
Date

James W Flynn
Director

NORTH DAKOTA GAME AND FISH DEPARTMENT

9-19-88
Date

Commissioner

SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS

5/31/88
Date

Douglas Hofer for Dick Beringson
Secretary

NEBRASKA GAME AND PARKS COMMISSION

Sept. 26, 1988
Date

Rex Amack
Director

IOWA DEPARTMENT OF NATURAL RESOURCES

May 3, 1988
Date

Director

KANSAS DEPARTMENT OF WILDLIFE AND PARKS

6/10/88
Date

Robert L Meinen
Secretary

MISSOURI DEPARTMENT OF CONSERVATION

10-17-88
Date

Jerry J Presley
Director

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE UNITED STATES FISH AND WILDLIFE SERVICE
AND
THE MISSOURI RIVER NATURAL RESOURCES COMMITTEE

This memorandum is entered into between the Missouri River Natural Resources Committee, an organization of representatives of the conservation agencies of Montana, North Dakota, South Dakota, Nebraska, Iowa, Kansas, and Missouri, hereinafter referred to as the Committee and the United States Fish and Wildlife Service, Department of Interior, hereinafter referred to as the Service. For the purposes of this memorandum, the Missouri River is defined as the area of land and water within the floodplain of the Missouri River from its source at the confluence of the Gallatin, Madison, and Jefferson Rivers at Three Forks, Montana, to its mouth at the Mississippi River near St. Louis, Missouri.

WHEREAS:

1. The Committee has been organized under the sponsorship of the States of Montana, North Dakota, South Dakota, Nebraska, Iowa, Kansas, and Missouri under a Constitution dated October 17, 1988, for the purpose and objective of promoting and ensuring the good stewardship of the Missouri River.

2. The Fish and Wildlife Coordination Act of March 10, 1934 (48 Stat. 401) as amended (16 U.S.C. 661 et. seq.), hereinafter referred to as the Act, states as one of its purposes:

   "...that wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation..."

   The Service, through delegation from the Secretary of the Interior, is authorized:

   "...to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection...of all species of wildlife, resources thereof and their habitat...to make surveys and investigations of the wildlife of the public domain...and...to accept...contributions of funds in furtherance of the purposes of this Act."

3. The Service has, since its inception, cooperated with the Committee, providing a Coordinator defined in Article IV, Section 2 of the Constitution of the Committee, and participating as an Ex-Officio Member by appointing delegate(s) to take part in Committee meetings defined in Article III, Section 1 (b) of the Constitution. In addition, the Service has interests along the Missouri River that

transcend state boundaries. The Service holds lands involved in several wildlife refuges located along the river and has an active fish hatchery and fishery research program of regional interest at several locations along the river.

4. The Service has agreed to assist the Committee by providing a Coordinator with at least half of his/her duties assigned to carry out such duties and functions as shall hereinafter be agreed upon.

5. The Service has also agreed to provide office space, supplies, equipment, printing services, and such services and maintenance as may be necessary for the Coordinator to carry out his/her duties and functions in an efficient manner.

NOW THEREFORE, it is mutually agreed by the Service and the Committee, in furtherance of the purposes and objectives both of the Committee and of the Service under the mandate of the Act, as follows:

1. The Service shall assist the Committee by providing a Coordinator to serve upon the following terms and conditions and to perform the following duties:

   a. The Coordinator of the MRNRC shall be a regularly salaried employee of the Service and shall serve an indefinite term. The chairman of the MRNRC shall be advised in advance when it is necessary to appoint a new Coordinator, and the new Coordinator mutually agreed upon by the Committee.

   b. The Committee will assist the Coordinator in developing annual work plans so he/she can assist the Chairman in furthering the goals and objectives of the MRNRC, in organizing the Committee's activities, and in coordinating among local agencies, and the public. The Coordinator shall be required to perform specific tasks associated with the administration of the Committee, such as:

      (1) Maintain the administrative record of all Committee activities.

      (2) Manage the development of information and reference documents, with such responsibility to include oversight of all records, documents, and publications that are to be either prepared or adopted by the Committee.

      (3) Supervise the development of coordinated natural resource plans.

      (4) Prepare for publication the Proceedings of the Annual Meeting and other publications and publicity materials as the Committee may direct.

      (5) Report for the Chairman at meetings and conferences, and at Ad Hoc Committee meetings, as appropriate.

2. This memorandum may be modified or amended at any time by either party thereto by giving the other party 30 days advance notice in writing.

3. Upon execution, this memorandum shall be of full and binding force and effect as set forth unless and until modified or abrogated by the parties or unless existing authority of either the Service or the Committee to carry out its terms is modified or withdrawn.

4. The Committee agrees to comply with the requirements of Executive Order No. 11246 and to 43 CFR 17*, both of which are incorporated into this memorandum by reference.

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* Executive Order No. 11246 is the Federal Government's policy of equal employment opportunity.

* 43 CFR 17 effectuates the provisions of the Civil Rights Act of 1964 and sets forth the non-discrimination policy in Federally assisted programs.

MISSOURI RIVER NATURAL RESOURCES COMMITTEE

October 11, 1991
Date

Norman Stucky
Chairman

UNITED STATES FISH AND WILDLIFE SERVICE

October 21, 1991
Date

Lynn B. Starnes
Regional Director